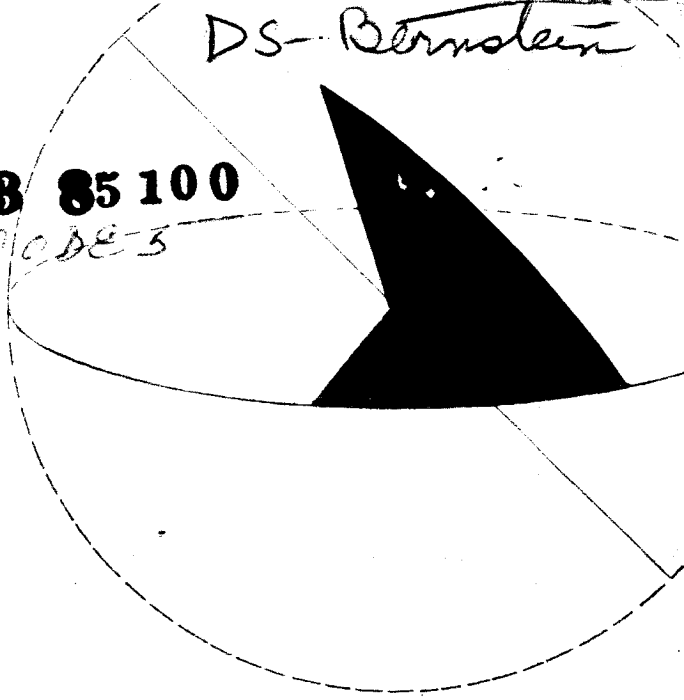

LITERATURE SEARCH NO. 254

BIOLOGICAL AND ARTIFICIAL INTELLIGENCE

DECEMBER 1960

JET PROPULSION LABORATORY
CALIFORNIA INSTITUTE OF TECHNOLOGY

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LITERATURE SEARCH NO. 254

BIOLOGICAL AND ARTIFICIAL INTELLIGENCE

~~Compiled by~~
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CONTENTS

Feasibility of Simulating Thought Processes by Machine 1
General Automata 4
Models and Theories of General Thinking Processes and Behavior 6
Intelligence Testing 35
Models and Theories of Nerve Transmission 42
Electrical Study of the Brain and Its Functions 49
Physiology and Anatomy of the Brain 59
Machine Perception—Mapping 68
The Perceptron 78
Automatic Translators 80
Models and Theories of Perception 82
Machine Learning and Memory 113
Models and Theories of Learning 116
Models and Theories of Memory or Recall 142
Decision Making by Machine 146
Models and Theories of Decision Making 150
Information Theory 168
Man–Computer Symbiosis 176
Author Index 179

FEASIBILITY OF SIMULATING THOUGHT PROCESSES BY MACHINE

1. LE PROBLEME DE L'INFORMATION ET LA CYBERNETIQUE (THE PROBLEM OF INFORMATION AND CYBERNETICS)
Ruyer, R.
Journal de psychologie normale et pathologique, v. 45, pp. 385–418, 1952

Cybernetics, like behaviorism, is an excellent theory from the viewpoint of scientific methodology, but thoroughly inaccurate. The mechanistic thinking of cybernetics and of behavioristic theories neglects the role of man's creativeness (something no machine can possess). Inaccurate, too, is phenomenology's rejection of the role of essential meanings underlying immediate experience. The author prefers a "certain Platonism" which relates memory and information to inventiveness and the psychological world to underlying essences. (*PsyA*, 1954, #67)

2. SOME DIFFERENCES BETWEEN ROBOTS AND HUMAN BEINGS IN PROCESS OF DECISION-MAKING
Trimmer, J. D.
Journal of the Instrument Society of America, v. 1, no. 11, pp. 22–23, November 1954

While automatic control systems can make decisions only when given sufficient information, human beings generally have to decide on insufficient evidence. Some implications of the difference are examined and the possibility of constructing human-resembling robots is explored, particularly for automatic controls. The applicability to automation is discussed. (*EI*, 1955, p. 76)

3. HUMAN ENGINEERING OR HUMAN ERROR
Long, G. E.
Air University Quarterly Review, v. 7, p. 62, 1954

Man as a monitor for a machine and man operating a machine, within limits, are both considered. It is pointed out that the human has abilities no machine can duplicate, among them background information, flexibility to the novel, and pattern perception.

4. MACHINES, ROBOTS AND MINDS
Thomson, R. and Sluckin, W.
Durham University Journal, v. 46, pp. 116–122, 1954

Purposeful action and learning, which have been considered to be distinguishing characteristics of living organisms, can now be reproduced mechanically. Discussions of teleological mechanisms, which have appeared under the heading of "cybernetics," have generally been in support of a mechanistic metaphysic of mind. The authors maintain that the empirical content of discussions of cybernetics is largely irrelevant to metaphysical questions concerning the human mind. Cybernetics may be helpful to psychologists, however, in suggesting research problems in the areas of learning, thinking, and memory. The assumption that negative feedback mechanisms underlie the operation of the central nervous system may prove to be of some value to neurophysiology, but it is doubtful whether the electronic analogue can adequately represent the functions of the central nervous system as a complex whole. (*PsyA*, 1955, #6486)

5. CIBERNETICA (CONCLUSION): MATEMATICAS, LOGICA Y MAQUINAS (CYBERNETICS [CONCLUSION]: MATHEMATICS, LOGIC AND MACHINES)
Sadosky, M.
Acta Neuropsiquiatrica Argentina, v. 1, pp. 300–307, 1955

After an examination of the mathematical and "logical" achievements of machines, e.g., Shannon's "rat," Sadosky concluded that when "idealists" propose "philosophical and sociological theories about the . . . substitution of men by machines," cybernetics is transformed into mysticism at best and science fiction at the worst, with only irrationality profiting thereby. (*PsyA*, 1957, #37)

6. HUMAN COMPUTER IN FLIGHT CONTROL
Fogel, L. J.
IRE Transactions on Electronic Computers, v. EC-6, no. 3, pp. 195–202, September 1957

7. KIBERNETIKA I NEKOTORYE VOPROSY FIZIOLOGII I PSIKHOLOGII (CYBERNETICS AND SOME PROBLEMS OF PHYSIOLOGY AND PSYCHOLOGY)
Bélénesku, I. N.
***Voprosy Filosofii*, v. 11, pp. 153–166, 1957**

Wiener, Ashby, and Couffignal are criticized for bypassing the data of physiology in their intemperate indulgence in "unrestrained analogizing" and "fantastic interpretation and generalization" in cybernetic applications to man. Kossa is criticized for his "idealistic refutation" of cybernetics, since "indeterminism in understanding behavior" is intolerable. Frolov is criticized for playing down the positive side of cybernetics. A Marxian and Pavlovian analysis of the similarities and differences between the brain and the calculating machine follows. Among the differences noted are the presence in the former of equipotentiality, the ability to "convert external factors into internal factors which may produce structural changes, transmittable by heredity," and creativity. The laws of brain activity are in principle not reducible to those of physics. (*PsyA*, 1958, #3472)

8. HUMAN BRAIN UNIQUE
***Science News Letter*, v. 73, p. 36, January 18, 1958**

9. HUMAN FACTORS IN SPACE FLIGHT
Konecci, E. G.
***Aero/Space Engineering*, v. 17, no. 6, pp. 34–40, June 1958**

In the course of discussion it is pointed out that in spite of human limitations man can never be fully replaced by a machine.

10. MAN–MACHINE RELATIONSHIPS
Taube, M.
***Datamation*, v. 5, no. 1, p. 18, January–February 1959**

The question is whether a machine can simulate a human brain. The author says "No," and defines the relationship between machine and man as being one of complementation and augmentation, not simulation.

11. COMPUTER OR MAN IN SPACE
Danishevsky, D. S.
***Computers and Automation*, v. 8, no. 7, p. 6, July 1959 (Readers' and Editors' Forum)**

12. CONVERSATION WITH A COMPUTER
Green, L. E. S. and Gotlieb, C. C.
***Computers and Automation*, v. 8, no. 10, pp. 9–11, October 1959**

Can a computer carry on a conversation?

About 1938 the English mathematician, Turing, suggested that a machine could be said to be capable of thinking if it could carry on a conversation with a human being in another room, in such a way that the human being could not tell if he were conversing with a machine or with another human being. Since that time, this definition of a computer's thinking has stood as a challenge to computer people.

13. THE PILOT'S ROLE IN SPACE FLIGHT
Westbrook, C. B.
***Aero/Space Engineering*, v. 18, no. 11, pp. 51–54, 67, November 1959**

Man's basic capabilities and their usefulness in space travel control are discussed. As an actuator and as a sensor system, man has been largely replaced by instrumentation. As a computer, man, although inferior to instruments in speed of calculation, possesses unique capabilities for the solution of complex problems. In all three functions, man's usefulness lies in his adaptability, wide range of capability and his ability to recognize patterns and make correlations. As part of a complete control system, man's slow response, tendency to make mistakes, and physical needs must be weighed against his versatility as sensor and computer, his judgment ability, and regenerative powers. Certain functions in spaceflight might be performed by man in order to reduce instrument weight. Human piloting will be required, however, for difficult tracking, tasks of judgment (for example, Moon landing), and repair of equipment. Man's greatest contribution will be in the correction of minor deviations in the instrument control system, which in the case of an Earth-to-Moon-and-return flight, for instance, at present reduce probability of success to about 0.22.

14. COULD A MACHINE MAKE PROBABILITY JUDGMENTS? PART I AND PART II
Good, I. J.
***Computers and Automation*, Part I, v. 8, no. 1, pp. 14–16; Part II, v. 8, no. 2, pp. 24–26, 1959**

15. AUTOMATION, CYBERNETICS, AND SOCIETY

George, F. H.
Philosophical Library, Inc., New York, N.Y., 1959

In the present age, the author feels that in one way or another the lives of all human beings are affected by automation. This book is an explanation for laymen, as well as scientists, of cybernetics and its application as automation. He treats automation as part of the process of scientific evolution. In that sense, then, it isn't as new a system as it appears to be. Society, however, must decide which of the endless possibilities of automation it wishes to exploit. In the final chapter, the philosopher-author discusses the future with optimism—after warning that automation, used unwisely, can destroy this world. (*C&A*, September, 1959)

16. AIEE PANEL SCANS SUBJECT OF ADAPTING HUMAN BRAIN, NERVOUS SYSTEM PRINCIPLES TO MACHINES

American Institute of Electrical Engineers, New York, N. Y., 1959

The question of how the workings of the human brain and nervous system can be adapted to machines so that man can design better communications equipment was the subject of a panel discussion during the five-day Winter General Meeting of the American Institute of Electrical Engineers.

Taking part in the panel, which is titled "Parallel Computations of the Nervous System—Reliability Through Redundancy," are Dr. Warren McCulloch of the Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge; Dr. Oliver Selfridge, Lincoln Laboratory, Massachusetts Institute of Technology, Lexington; and Dr. Heintz Von Furster, University of Illinois, Urbana.

"Scientists have long been aware of the remarkable powers of the human brain and nervous system to utilize astonishingly small quantities of sense data to arrive at reliable decisions regarding the external world," said Kenneth W. Jarvis, Winnetka, Illinois, chairman of the panel. "This ability exceeds by far the capacity of devices or machines designed by engineers. It is believed that a great advance in the reliability of operation of equipment could be made if analogs of the brain and nervous system could be used in the design of communication equipment.

"It seems that one factor in this remarkable capacity is that parallel sensory paths are utilized and their outputs compared at various levels. Most probable values of the sense data are computed and cross compared, resulting in a high degree of reliability. In essence, operation is in parallel rather than serially." (*C&A*, February 1960)

17. ASTRONAUTS WILL EARN THEIR WAY

***Missiles and Rockets*, v. 6, no. 8, pp. 42–43, February 22, 1960**

The idea is advanced that man is still our top machine in adaptability.

18. INTELLIGENCE IN COMPUTERS: THE PSYCHOLOGY OF PERCEPTION IN PEOPLE AND IN MACHINES

Uhr, L.
***Behavioral Science*, v. 5, no. 2, pp. 177–182, April 1960**

The idea is advanced that the computer and the mind are (potentially) functionally equivalent, and that programming intelligence into the machine black box should be easier than determining it in the human. The present non-algorithmic use of the computer is lamented as "a permanently arrested embryo, or, at best, an idiot savant." Analogy to human neural transmission is pointed out.

19. SPACE PILOTS SHOW SUPERIOR CAPABILITIES

Sweeney, R.
***Aviation Week and Space Technology*, v. 72, no. 20, pp. 66–74, May 16, 1960**

According to the Manned Space Stations Symposium in Los Angeles, pilots not only will have an important part of space systems but in a number of conditions will be superior to automatic flight control systems in performance.

20. MAN AND COMPUTER IN SPACE

Nyman, A.
***Air Force and Space Digest*, v. 43, no. 5, pp. 60–61, May 1960**

Computers, like all tools, save time and effort, but they remain an indirect use of intelligence. Needed for astronautics are lightweight systems that simplify data and give the human pilot the chance to feed into the mission his own unique capabilities.

GENERAL AUTOMATA

21. A NEURAL-ANALOGUE CALCULATOR BASED UPON A PROBABILITY MODEL OF REINFORCEMENT
Minsky, M. L. and Edmunds, D.
January 8, 1952
Harvard University, Psychological Labs., Cambridge, Mass.,
PLR-1

22. AUTOMATIC CONTROL
Simon and Schuster, Inc., New York, N.Y., 1955

A collection of 12 articles reprinted from the *Scientific American* which discuss feedback control principles, automation in industry, information theory, and machine models of life. (*PsyA*, 1956, #6508)

23. REPRESENTATION OF EVENTS IN AUTOMATA
Medvedev, Yu. A.
October 5, 1956
Moscow University Mathematical Computing Faculty Seminar, 1956–1957
To be published in *Problems of Cybernetics*

24. ESSAY ON AN ARTICLE OF CULBERTSON — SOME UNECONOMICAL ROBOTS — (COLLECTION "AUTOMATA")
Yablonskii, S. V.
November 30, 1956
Moscow University Mathematical Computing Faculty Seminar, 1956–1957
To be published in *Problems of Cybernetics*

25. A MODEL OF A TORTOISE
Vasilyev, R. R.
December 14, 1956
Moscow University Mathematical Computing Faculty Seminar, 1956–1957
To be published in *Problems of Cybernetics*

26. SELF-REPAIRING AND REPRODUCING AUTOMATA
Meier, R. L.
Computers and Automation, v. 5, no. 12, p. 10, December 1956

27. ANIMALS, "AN ELECTRO-MECHANICAL MODEL OF SIMPLE ANIMALS"
Sutherland, W. R., Mugglin, M. G., and Sutherland, I.
Computers and Automation, v. 7, no. 2, pp. 1, 3, 6; v. 7, no. 2B, pp. 1, 4, 5, February 1957

28. GROUP BEHAVIOR OF ROBOTS
Kochen, M.
Computers and Automation, v. 6, no. 3, p. 16, March 1957

29. ROBOTS AND AUTOMATA: A SHORT HISTORY
Culbertson, J. T.
Computers and Automation, v. 6, no. 3, p. 32, March 1957; Bibliography, v. 6, no. 4, p. 20, April 1957

30. THINKING BY MACHINE; A STUDY OF CYBERNETICS
de Latil, P.
Golla, Y. M., Translator
Houghton Mifflin Co., Boston, Mass., 1957

31. LANGUAGES, LOGIC, LEARNING, AND COMPUTERS
Carr, J. W., III
Computers and Automation, v. 7, no. 4, p. 21, April 1958

32. **LOGICAL MACHINE DESIGN: SELECTED BIBLIOGRAPHY**
Netherwood, D. B.
Symposium on Computers in Simulation, Data Reduction, and Control
***IRE Transactions on Electronic Computers*, v. EC-7, no. 2, pp. 155–178, June 1958**

33. **CYBERNETIC SCHEDULER**
Doerr, E.
***Computers and Automation*, v. 7, no. 11, p. 24, November 1958**

34. **A SMALL MIND, NORMAL FOR ITS SIZE**
Kallman, H. E.
***Proceedings of the IRE*, v. 47, no. 2, pp. 330–331, February 1959 (Correspondence)**

An amusing description of an electronic "pet" is given.

35. **AUTOMATA**
Ruzic, N. P., Editor
***Industrial Research*, v. 1, no. 2, pp. 47–59, Spring 1959**

With science fiction overtones, this article describes some possibilities for future computers, of which it is said: "The differences between the new self-organizing systems—automata—and present-day computers will be as vast as the differences between computers and office adding machines." The author suggests raising computers as one would children, from early mistakes and awkwardness, to intelligence and sophisticated thinking. (*C&A*, July 1959)

36. **ANALYSIS OF THE WORKING PRINCIPLES OF SOME SELF-ADJUSTING SYSTEMS IN ENGINEERING AND BIOLOGY**
Braines, S. N., Napalkov, A. V., and Shreider, Yu. A.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 298–303

37. **SELF-REPRODUCING MACHINES**
Penrose, L. S.
***Scientific American*, v. 200, no. 6, p. 105, June 1959**

Experiments have been made building simple machines which assemble themselves through shaking, etc., into larger units. These lead to self-reproducing multiple copies from simple units. The process sheds light on the self-reproduction of biological molecules. (*C&A*, 1959)

38. **COMPUTERS SIMULATING MEN**
Massnick, F.
***Computers and Automation*, v. 8, no. 10, pp. 17–18, October 1959**

39. **RECURSIVE FUNCTIONS OF SYMBOLIC EXPRESSIONS AND THEIR COMPUTATION BY MACHINE—THE LISP PROGRAMMING SYSTEM**
McCarthy, J.
1959
Massachusetts Institute of Technology, Research Lab. of Electronics, Cambridge
Quarterly Progress Report 53

A report of work done with the List Processor (LISP) system, by members of the Artificial Intelligence Group, at the MIT Computation Center. Twenty useful subroutines have been programmed, translated into SAP, and checked out on the IBM 704. Studies are being conducted on the use of LISP in engineering problems, but the system was used mainly in the study of recursive functions, and the description of this application constitutes the major part of the report. A number of operations are described, and the language of LISP is discussed. (*C&A*, September 1959)

40. **IPL-V: THE NEWELL-SHAW-SIMON PROGRAMMING LANGUAGE**
Green, B. L., Jr.
***Behavioral Science*, v. 5, no. 1, pp. 94–98, January 1960**

Information processing language (IPL-V), is the fifth in a series of programming languages developed by Newell, Shaw, and Simon to simplify programming very complex processes on digital computers, and is an outgrowth of the work of these authors in the computer simulation of cognitive processes.

MODELS AND THEORIES OF GENERAL THINKING PROCESSES AND BEHAVIOR

41. ORGANIC PROCESSES AND CONSCIOUSNESS
Angell, J. R. and Thompson, H. B.
Psychological Review, v. 6, p. 32, 1899

42. THE EXISTENCE AND FUNCTION OF INNER SPEECH IN THOUGHT PROCESS
Reed, H. B.
Journal of Experimental Psychology, v. 1, pp. 365–392, 1916

43. AN APPLICATION OF SYMBOLIC LOGIC TO BEHAVIORISTIC PSYCHOLOGY
Fitch, F. B.
Journal of Symbolic Logic, v. 4, p. 39, 1939

F. B. Fitch, C. L. Hull, and D. G. Ellson have presented a symbolic formalism for the main outlines of Hull's system of behavioristic psychology. A set of axioms is constructed for the purpose of analyzing such notions as stimulus, response, tendency, positive conditioning, extinction, generalization of extinction, and others.

44. SYMBOLS, SIGNS AND SIGNALS
Ducasse, C. J.
Journal of Symbolic Logic, v. 4, pp. 41–52, 1939

The author considers interpretation a kind of mental event in which consciousness of one thing causes consciousness of something else.

45. SYMBOLIC TECHNIQUE IN PSYCHOLOGICAL THEORY
Miller, J. G.
Psychological Review, v. 46, pp. 464–479, 1939

46. HUMANISTIC LOGIC AND THEORY OF KNOWLEDGE, OUR HUMAN TRUTHS
Schiller, F. C. S.
In "Our Human Truths," Columbia University Press, New York, N.Y., 1939, pp. 283–297

47. THE NATURE OF THOUGHT
Blanshard, B.
The Macmillan Co., New York, N. Y., 1940
Interpretations of necessity proposed by symbolic logicians and others are rejected.

A review is presented in *Journal of Symbolic Logic*, v. 5, p. 159, 1940

48. SYMBOLIC LOGIC AND BEHAVIOR THEORY: A REPLY
Fitch, F. B.
Psychological Bulletin, v. 37, pp. 817–819, 1940

49. MATHEMATICAL BIOPHYSICS OF THE CENTRAL NERVOUS SYSTEM
Householder, A. S. and Landahl, H. D.
Mathematical Biophysics Monograph Series, No. 1, Principia Press, Bloomington, Ind., 1945

50. HUMAN KNOWLEDGE
Allen and Unwin, Ltd., London, 1948

51. THE BRAIN AS A COMPUTING MACHINE
McCulloch, W. S.
Electrical Engineering, v. 68, pp. 492–497, 1949

52. NIEKTORE POSTACIE MYSLENIA ZE STANOWISKA PSYCHOFIZJOLOGII (SOME KINDS OF THINKING FROM THE STANDPOINT OF PSYCHOPHYSIOLOGY)
Arend, R.
Przeglad Lekarski, v. 5, pp. 664–670, 1949

The analysis of pictorial, verbal, "two-tracks" and cryptonic thinking, and intuition, in the light of psychiatric and psychophysiological data and theories, illustrated with eight typical examples. English summary. (*PsyA*, 1955, #6886)

53. THE ORGANIZATION OF BEHAVIOR
Hebb, D. O.
John Wiley & Sons, Inc., New York, N.Y., 1949

54. CONSCIOUSNESS AND BEHAVIOR
Culbertson, J. T.
William C. Brown Co., Publishers, Dubuque, Iowa, 1950

55. KHOD RAZVITIIA NAUCHNOGO NASLEDSTVA I. P. PAVLOVA V OBLASTI NERVNOI DEIATELNOSTI (THE COURSE OF DEVELOPMENT OF THE SCIENTIFIC HERITAGE OF I. P. PAVLOV IN THE FIELD OF HIGHER NERVOUS ACTIVITY)
Orbeli, L. A.
Moskva: Moskouskoye Obshchestro Isytatelnoy Prirody, 1950

This is a short outline of work carried on in the Institute of Experimental Medicine in Koltushi, in the Physiological Institute of the Academy of Sciences, and in the Department of Physiology of the Military Medical Academy, on the dynamics of those nervous processes which participate in the collision of acquired and innate activity. (Orbeli, Vatsuro, Denisova, Voronin, Asratian, Promptov, and others.) (*PsyA*, 1954, #282)

56. O BEHAVIORISMO MOLAR DE E. C. TOLMAN (THE MOLAR BEHAVIORISM OF E. C. TOLMAN)
Gomes Penna, A.
***Anuario do Instituto de Psicologia*, v. 1, pp. 77–80, 1951**

This theory represents a transition between Watson and Hull, with influence also from the Gestaltists, MacDougall, Woodworth, Brunswick, and the operationism of Bridgman. It is a kind of "propositionism." The terms instinct and intention are used as functional aspects of behavior. These aspects of behavior are distinguished by independent variables, (1) environment, (2) physiological processes, (3) hereditary structure, (4) habits, and (5) maturation; and intermediate variables, which are logical constructions corresponding to mental processes. Gomes Penna has thus been criticized as being excessively mentalistic.

57. CEREBRAL MECHANISMS IN BEHAVIOR—THE HIXON SYMPOSIUM
McCulloch, W. S.
John Wiley & Sons, Inc., New York, N.Y., 1951

58. THE MIND–BRAIN PROBLEM
Sperry, R.
***American Scientist*, v. 40, no. 2, 1952**

59. PROJECTIVE TECHNIQUES AND THE THEORY OF THINKING
Rapaport, D.
***Journal of Projective Techniques*, v. 16, pp. 269–275, 1952**

Four topics: projection, motivations of selective perception, fixed tools of thought vs. processes of thought, and varieties of conscious experience, which are of import both for projective techniques and for the theory of thinking are discussed. 22 references. (*PsyA*, 1954, #2254)

60. MIND, MEANING, AND BEHAVIOR
Sellars, W.
***Philosophical Studies*, v. 3, pp. 83–95, 1952**

This paper is a logical analysis of the mind-body problem. "The mind-body problem is, at bottom, a problem whether intentional concepts relating to minds can be reduced to nonintentional concepts, whether concepts of sense qualities, or physicalistic concepts, or both, and if so, in exactly what sense of 'reduced'." The author's answer is: "If scientific behaviorism is correct, and if our account of sentences of the form '. . . means . . .' or '. . . is about . . .' is correct, then every mental event can (in principle) be described in terms of expressions which are definable in terms of bodily states." (*PsyA*, 1954, #69)

61. MENTALITY IN MACHINES
MacKay, D. M.
Proceedings of the Aristotelian Society,
Supplement 26, pp. 61–86, 1952

62. THE BRAIN ANALOGY: A DISCUSSION
Coburn, H. E.
Psychological Review, v. 59, pp. 453–460, 1952

Intelligence, learning rate, and reinforcement are re-appraised in the light of the brain analogy theory of behavior. (*PsyA*, 1954, #36)

63. DESIGN FOR A BRAIN
Ashby, W. R.
Chapman and Hall, London, 1952
John Wiley & Sons, Inc., New York, N. Y., 1952

64. PROPRIOCEPTIVE CONTROL OF A HABIT
Radner, L., Zeaman, D., and Pickett, J. M.
August 1953
University of Connecticut, Storrs
Report 7, Nonr-63100
ASTIA AD-19,558

On the basis of Beck's experimental conditions (*Journal of General Psychology,* v. 20, pp. 375–397, 1939), an eyelid conditioning procedure was applied to three groups of subjects. Of the three groups, one (pre-tap) organized a movement cycle previous to training; a second (tap) made identical repetitive movements during training but had no previous practice; and the third (no-tap) made no consistent overt movements. Conditioning was obtained in all three groups, but learning was more stable when consistent proprioceptive feedback was present. The CR's of the pre-tap and tap group became highly synchronized with the beat-stroke of the movement cycle. The results are interpreted as indicative of a habit under proprioceptive control. Variations in the time relationship between internal and external cues is described. Current research is discussed in which overt and covert speech movements are used as the source of proprioception.

65. SOME PSYCHOLOGICAL PROGRAMS IN SWITZERLAND, FRANCE AND ITALY
Graham, C. H.
October 1, 1953
Office of Naval Research, London
Technical Report ONRL-120-53
ASTIA AD-19,417

At the University of Geneva work is continuing on the developmental aspects of illusions, the child's appreciation of mechanical causality, scales for specifying intellectual levels, inductive reasoning in children, and the developmental aspects of social behavior in small groups. At the University of Paris experiments are being conducted on time perception in children, schizophrenics, and neurological cases. Other work concerns the development of perception in children, the application of information theory to problem solving, and the effects of group activity on perception. The programs of the National Institute of Psychology in Rome and the National Organization for the Prevention of Accidents are outlined. The work of the Institute for Vocational Guidance and Applications of Psychology and the new Center for the Study of Accidents in Florence is discussed.

66. THINKING
Ryle, G.
Acta Psychologica, v. 9, pp. 189–196, 1953

Why has so little emerged from investigations of thinking theories, particularly of the Würzburg School? What concepts did the investigators start with? Logicians' premises formed the basis; these were largely introspective. They sought to obtain systematic data on elements whose existence can only be determined on *a priori* grounds. Methodological errors also played a part, introducing the concept of task. Problems were limited to what could already be demonstrated. They attempted to isolate what could not be isolated. Thought is an art, not a natural process. German summary. (*PsyA*, 1954, #4018)

67. SOME REFLECTIONS UPON GILBERT RYLE'S CONSIDERATIONS
Humphrey, G.
Acta Psychologica, v. 9, pp. 197–200, 1953

False philosophical assumptions have been tested by experiment and proved to be false. Negative results necessarily seem nugatory. Obviousness is no final earnest

of obvious things. It is the duty of psychologists to find what is common to the different activities classed as thinking, and the fact that thinking is an art does not necessarily preclude its examination by experimental methods. (*PsyA*, 1954, #4011)

68. STRUCTURES OPERATIONNELLES ET CYBERNETIQUE (FUNCTIONAL STRUCTURES OF CYBERNETICS)

Piaget, J.
***Année psychologique*, v. 379–390, 1953**

Cybernetics constitutes a mathematization of thought. The functional theory of intelligence leads to a pattern of thought structures such as are observed psychologically. Cybernetics constitutes a pattern of general mechanisms of information and construction that occur in the nervous process. A relative correspondence exists between the two kinds of pattern. This correspondence is the forerunner of an isomorphism between functional psychological and certain nervous structures. (*PsyA*, 1954, #8294)

69. CYBERNETICS AND MENTAL FUNCTIONING

Thomson, R. and Sluckin, W.
***British Journal of Philosophical Science*, v. 4, pp. 130–146, 1953**

The authors are interested in classifying and interpreting discussions of the cybernetic hypothesis which seem to go beyond its supporting evidence. A survey of such topics as problem-solving, learning, thinking, and purposeful behavior exposes considerable metaphysical preoccupation on the part of writers on cybernetics. It is suggested that the principal value of cybernetics is to be found in those writings which confine themselves to the negative feed-back hypothesis of neurophysiology. (*PsyA*, 1954, #3532)

70. ON HUMAN THOUGHT

Hebb, D. O.
***Canadian Journal of Psychology*, v. 7, pp. 99–110, 1953**

Scientific understanding means: (1) having a model or theory of the phenomena to be understood yet lacking detail and apparent contradiction of reality, and (2) seeing the incompleteness and defects of the theory. Exploration of new theory should challenge and guide us. Effect on whole range of behavior must be questioned. Important area for theory construction is thought, especially its motivation. (*PsyA*, 1954, #3514)

71. GENETIC PSYCHOLOGY AND EPISTEMOLOGY

Piaget, J.
***Diogenes*, no. 1, pp. 49–63, 1953**

Three examples of epistemological problems—mathematical vs. physical knowledge, the concept of continuity, the character of the integer—are discussed from the point of view of the ontogenesis of thinking in the young child. The author feels that "the new method of analysis offered by genetic psychology affords a supplementary source of epistemological information." (*PsyA*, 1954, #5748)

72. O NEKOTORYKH VOPROSAKH EVOLIUTSIONNOI FIZIOLOGII V SVETE UCHENIIA I. P. PAVLOVA (ON SEVERAL PROBLEMS OF EVOLUTIONARY PHYSIOLOGY IN THE LIGHT OF I. P. PAVLOV'S THEORY)

Karamian, A. I.
***Fiziologicheskii Zhurnal SSSR*, v. 39, no. 1, pp. 107–116, 1953**

The theory of "dissolution" of nervous functions is attacked. "The development of the central nervous system proceeds not along the path of preservation of old forms of nervous activity, but contrariwise, it proceeds along the path of gradual and slow annihilation of old coordinated systems and (simultaneously) along the path of creation of new systems, guaranteeing a more effective adaptation to changes of conditions in the external environment." If injury to or ablation of the newer divisions of the c.n.s. allow other coordinative mechanisms to appear, "we have the right to speak not of return to ancient functions, but of the emergence of new coordinated mechanisms, which have been brought into existence by the remaining parts of the c.n.s. at the given level of development of the animal." Phenomena such as these may be comprehended only from the dialectical materialist point of view. (*PsyA*, 1954, #3707)

73. COGNITIVE CONTROLS IN SERIAL BEHAVIOR PATTERNS

Smith, G. J. W. and Klein, G. S.
***Journal of Personality*, v. 22, pp. 188–213, 1953**

Three serial patterns of behavior were considered, namely, Cumulative (*C*), progressively slowed response and lowered resistance interference; Dissociative (*D*), variable resistance to interference; and Stabilized (*S*), evenly maintained resistance-level. Findings support the conclusion that stylistic consistencies inferred from serial patterns of cognitive behavior permit prediction of performance in several cognitive situations. 21 references. (*PsyA*, 1954, #5587)

74. LOGICAL CONSTRUCTS AND PSYCHOLOGICAL THEORY

George, F. H.
***Psychological Review*, v. 60, pp. 1–6, 1953**

The differences in the reinforcement theories of Hull and Tolman are largely the result of different methods of theory construction. Analysis of theory building in psychology reveals that our models are confused with respect to their levels of abstraction and dimensions, and that ambiguity arises from the use of logical constructs and the existence of undefined terms. The continual replacement of logical constructs is necessary. In learning theory, molar analysis must be supplemented by molecular analysis to solve the problems of reinforcement. 28 references. (*PsyA*, 1954, #3513)

75. THE BRAIN ANALOGY: ASSOCIATION TRACTS

Coburn, H. E.
***Psychological Review*, v. 60, pp. 197–206, 1953**

Four phenomena: (1) secondary conditioning, (2) conditioned inhibition, (3) sensory preconditioning, and (4) transfer of differentiation, are seen as inadequately analyzed by the original brain analogy hypothesis by the author. This paper attempts an analysis of the first three of the above phenomena by the use of an association tract mechanism. The *AT* postulates appear to offer significant advantages in correlating behavior phenomena. (*PsyA*, 1954, #3933)

76. EXPECTANCIES AND HULLIAN THEORY

Behan, R. A.
***Psychological Review*, v. 60, pp. 252–256, 1953**

"The present paper is written to show that the Hullian theory of behavior is capable of including an expectancy concept which may be likened to that of Tolman. It is proposed to derive this concept of expectancy as a theorem to Hull's 1943 postulate set. Then, in the language that Hull has preferred, the notion of expectancy will be a corollary." The deduction which the author presents provides the necessary connections with other constructs in the theory. It becomes connected with all of the constructs in Hull's theory which contribute to ${}_{s}\bar{E}_{r}$. (*PsyA*, 1954, #3499)

77. THINKING CONCEPTUALIZED IN TERMS OF INTERACTING MOMENTS

McReynolds, P.
***Psychological Review*, v. 60, pp. 319–330, 1953**

A speculative, hypothetico-neurological theory of thinking is presented. The stream of thought is seen as based upon successive neural discharge patterns termed moments. A series of postulated interactions within a moment sequence is examined with regard to the problems of similarity, voluntary action, memory, learning, and consciousness. 27 references. (*PsyA*, 1954, #4014)

78. L'EVOLUTION DES PROPRIETES DES PROCESSUS NERVEUX (THE EVOLUTION OF THE PROPERTIES OF NERVOUS PROCESSES)

Voronine, L. G.
***Raison*, no. 7, pp. 39–44, 1953**

Results are presented of investigations on various animals. "The presented facts speak in favor of a development of mechanisms of analysis and synthesis of the nervous system in the course of phylogenesis. The more developed the nervous system is, the easier it is to preserve in it the traces of excitations, the easier to realize their combinations with the present excitations, and consequently, the possibility to form conditioned connections positive and inhibitory more and more complex and strong." (*PsyA*, 1956, #3905)

79. THE DEVELOPMENT OF THINKING PROCESSES
Russell, D. H.
***Review of Educational Research*, v. 23, pp. 137–145, 1953**

There are comparatively few researches on children's thinking, mental tests being mainly concerned with the products rather than the process of thinking. Much work, however, has been done in the area of children's knowledge of concepts and problem solving. More research is needed on children's percepts, memories, fantasies, their methods of problem solving, critical thinking, and creative thinking, particularly in a group or class room situation. 73-item bibliography. (*PsyA*, 1954, #541)

80. OBSHCHEE V TEORETICHESKIKH POZITSIIAKH I. P. PAVLOVA I N. E. VVEDENSKOGO–A. A. UKHTOMSKOGO (THAT WHICH IS COMMON IN THE THEORETICAL POSITIONS OF I. P. PAVLOV AND N. E. VVEDENSKI–A. A. UKHTOMSKII)
Chukichev, I. P.
***Zhurnal Vysshei Deiatelnosti*, v. 3, no. 2, pp. 279–295, 1953**

The common aspects of Pavlovian theory and that of Vvedenskiĭ–Ukhtomskiĭ are discussed under the following headings: (1) on the unity of opposite processes–excitation and inhibition, (2) the theory concerning parabiosis and the phasic states of the cortex, (3) on irradiation and concentration of the excitatory and inhibitory processes and their mutual induction, (4) Vvedenskiĭ-Ukhtomskiĭ's theory concerning "functional ability" and that of Pavlov's on "extreme reactivity." It is concluded that there is a "great closeness in the fundamental theoretical positions of Pavlov, Vvedenskiĭ, and Ukhtomskiĭ." (*PsyA*, 1955, #3248)

81. LA PENSEE ARTIFICIELLE: INTRODUCTION A LA CYBERNETIQUE (THE ARTIFICIAL THOUGHT: INTRODUCTION TO CYBERNETICS)
de Latil, P.
Gallimard, Paris, 1953

Contains detailed discussions of fundamental concepts and assumptions of cybernetics, such as the machine, feedback, automatic control, self-regulation in machines and organisms, causality, entropy, the method of models, etc., as well as the presentation of modern calculating machines, and homeostasis. (*PsyA*, 1957, #17)

82. THINKING AND EXPERIENCE
Price, H. H.
Harvard University Press, Cambridge, Mass., 1953

Deeply rooted in the psychism of the British empirical tradition, the author analyzes all the thinking processes which he calls conceptual cognition. He rejects the notion of reducing thinking to images or words, arguing vigorously for the presence and power of concepts in the mind when it remembers, recognizes, and thinks. The concept is basically a recognitional capacity or disposition. It shows itself "as a guiding force, determining the direction which the series of presented particulars take." (*PsyA*, 1954, #2253)

83. THE LIVING BRAIN
Walter, W. G.
W. W. Norton & Co., Inc., New York, N.Y., 1953

84. BERICHT UBER DEN 17. UND 18. KONGRESS DER DEUTSCHEN GESELLSCHAFT FUR PSYCHOLOGIE IN GOTTINGEN 26.–29. SEPTEMBER 1948, IN MARBURG, 31. JULI–4. AUGUST 1951 (REPORT OF THE 17TH AND 18TH CONGRESS OF THE GERMAN SOCIETY FOR PSYCHOLOGY, GOTTINGEN SEPTEMBER 26 TO 29, 1948, MARBURG, JULY 31–AUGUST 4, 1951)
Wellek, A., Editor
Gottingen: Verlag für Psychologie, Hogrefe, 1953

This report of the first post World War II Congress consists of a survey of studies on the nature of talent (K. Gottschaldt), a report of experiments dealing with general ability (J. C. Brengelmann), and references to or abstracts of 23 other papers, discussing sequential analysis of test data (R. Heiss, B. Muchow, H. Hiltmann, H. Lossen); phenomenological theory (K. Wilde); figural-optical experiments (E. Rausch); motivational theory

(H. Düker); existential philosophy and psychology (A. Wellek); disposition (J. Rudert); characterological polarities (U. Undeutsch); conscience and depth psychology (W. J. Revers); expressive movement and personality (B. Herwig); functional and structural analysis of behavior (E. Bornemann); graphological analysis (R. Pophal); problems of projective techniques (W. Witte); adjustment of first graders (H. v. Bracken); gastrointestinal psychosomatics (G. Munsch); eidetics (K. Schmeing); cultural anthropology (W. Hellpach); and psychology in Sweden (W. Jacobsen). Membership list is appended.

The report of the 1951 Congress consists of surveys of trends in learning theory (K. Wilde), factor analysis (R. Meili), and aphasia (E. Bay), as well as abstracts of 57 other papers, discussing psychological aspects of neurosurgery (H. W. Gruhle), perceptual recognition (O. Graefe), Euclidian geometry (I. Kohler), memory (C. Weinschenk), Gestalt reproduction (R. Fuchs), decision making (H. Thomae), planning (J. Dolch), striving (W. Metzger), and polarity of striving (W. J. Revers); pragmatic social psychology (K. Mierke); mentality of primitives (D. Brinkmann); depth developmental hypotheses (O. Kroh); instinctual aspects of personality (K. Resag); psychogenesis (W. Hartnacke); cortical personality (K. Küppers); attitudes (M. J. Hillebrand); flicker-fusion-frequency (H. v. Bracken), (H. W. Wendt); Gestalten (H. Schlosser); varied aspects of structure and achievement (B. Herwig, H. Dirks, W. Schlechtinger, and H. Kreisel); graphological aspects of character change (H. Schwung), development (W. Thost), adolescent personality (T. Valentiner), and educational counseling (H. Thost); electroscriptography (W. Luthe); Rorschach elements of experience level (E. v. Niederhöffer) and of murder (E. Schneider); color tests (C. Drey-Fuchs); diagnostic aspects of drawings (L. Zarncke), selection (F. Becker), and adult mental attainment (F. Arntzen); group behavior (T. Scharmann); Northeimer intelligence tests (H. J. Firnau); hormones and intelligence (H. Mücher); diagnostic tests of school children and adolescents (H. Hetzer, E. Kliemke, E. Höhn, G. Rahn, K. Strunz, M. Schorn, A. Weber); retarded children (M. Simoneit); prison treatment (W. Janiw, G. Suttinger, A. Däumling); vocational guidance (W. Beck, A. Huth); industrial psychology (N. Thumb, E. Bornemann); psychohygiene (G. Munsch); psychosomatics (G. H. Fischer); visual experiences in psychiatry (K. Schmeing); autosuggestion (W. Leibold); electroshock and learning (J. C. Brengelmann). (*PsyA*, 1956, #21)

85. BERICHT UBER DEN 19. KONGRESS DER DEUTSCHEN GESELLSCHAFT FUR PSYCHOLOGIE IN KOLN VOM 28. SEPTEMBER BIS 2. OKTOBER 1953 (REPORT OF THE 19TH CONGRESS OF THE GERMAN SOCIETY FOR PSYCHOLOGY, COLOGNE, SEPTEMBER 28 TO OCTOBER 2ND, 1953)
Wellek, A., Editor
Gottingen: Verlag für Psychologie, Hogrefe, 1953

The report of the 1953 Congress contains surveys of trends in Middle- and West-European social psychology (K. S. Sodhi), in Anglo-American social psychology (H. Thomae), in Middle- and West-European personality theories (W. J. Revers), and in Anglo-American personality theories (H. v. Bracken); a comparison of German and Anglo-American methods of personality research (J. C. Brengelmann); a history of the development of court psychologists (U. Undeutsch); and abstracts of 37 other papers, discussing potentials and limitations of diagnostic tests (R. Heiss, H. Hiltmann, K. H. Wewetzer, H. Becker); consciousness (C. Weinschenk); optical illusions (R. Tausch); inductive thinking (R. Kirchhoff); self-recollections (W. Witte); learning poetry (M. Kesselring); retroactive inhibition (H. Rohracher); displacement and fantasy (M. Krudewig); experimental studies of will (H. Wegener); motivational research (R. Fuchs); trial movements in behavior (H. Thomae); hypnosis and waking (M. T. Orne); structural theory in hypnosis (A. Wellek); disposition and character (J. Rudert, K. Strunz); problems of adolescence (M. J. Hillebrand, L. Gilen, E. Struck, F. Steinwachs, F. Winnefeld, E. Boesch); social problems (A. Mayer, E. Bornemann, W. Janiw, E. Schliebe-Lippert); Rorschach test (O. Ewert, W. H. Müller, K. J. Groffmann); PI test (E. Mittenecker); integration of experience (A. Däumling); differential diagnosis of somatopsychic conditions (P. Kerschbaum); glutamic acid therapy (E. Nolte); selection of radio programs (O. Graefe); and a review of Marbe's statistics (M. Schorn). (*PsyA*, 1956, #22)

86. SERVO PRINCIPLES IN SENSORY ORGANIZATION AND THE TRANSFER OF SKILL
Gibbs, C. B.
July 1954
Applied Psychology Research Unit, Cambridge,

Great Britain
Report APU 218/54
ASTIA AD-49,675 (See also AD-73,365)

The paper presents a brief account of biological findings which support the belief that there are essential similarities between the control characteristics of human movement, and those of analogous devices which have been developed, somewhat more recently, by servo engineers. The bearing of these analogies upon the study of the transfer of skill is briefly discussed, by developing a hypothetical servo model of tracking skill and the placing reaction. It is shown that the invariants of the servo model correspond closely with the varieties of a skilled task between which a trained human operator shows high positive transfer. No or negative transfer of skill is found where two tasks differ in such a way that a servomechanism designed to discharge the first task would need considerable modification to do the second. The relevance and usefulness of servo models and terminology to the study of the transfer of skill is emphasized, and the practical and theoretical implications are outlined.

87. CIBERNETICA: REALIDADES Y FALACIAS (CYBERNETICS: FACTS AND FALLACIES)

Sadosky, M.
Acta Neuropsiquiátrica Argentina, v. 1, pp. 97–103, 1954

Sadosky rejects the "newness" of the cyberneticists' discussions of servomechanisms as a claim to interest, pointing to the work of physiologists such as Cannon and Bernard on homeostasis. He feels that cybernetics is, at the most, a new point of view which emphasizes a unified approach for psychologists, mathematicians, biologists, etc., to the life processes, and that it is, at the worst, in danger of reductionism and animism. (*PsyA*, 1956 #6488)

88. A VIEWPOINT IN THEORY AND EXPERIMENTATION ON HUMAN LEARNING AND THINKING

van Parreren, C. F.
Acta Psychologica, v. 10, pp. 351–380, 1954

Research on thinking is not so much inadequate as one-sided. The principle of stratiformity can be applied to autonomous (involuntary and perceptual) and intentional thinking and learning. Motivation, mind-set, Gestalt principles, the work of Thorndike, Heidbreder, Selz, Ach and De Groot's studies in phase-thinking (as in chess) are reviewed. 32-item bibliography. (*PsyA*, 1955, #6906)

89. THE DISCRIMINATION OF SEQUENCES IN STIMULUS EVENTS AND THE TRANSMISSION OF INFORMATION

Grant, D. A.
American Psychologist, v. 9, pp. 62–68, 1954

This article indicates the importance to psychologists of the communication model in analyzing behavior as a time series. Illustrations from the areas of clinical diagnosis, trouble shooting, and problem solving behavior show how a time series analysis of behavior may be useful. (*PsyA*, 1954, #6745)

90. ON COMPARING THE BRAIN WITH MACHINES

MacKay, D. M.
American Scientist, v. 42, pp. 261–268, 1954

Brain function may be approached from a physiological and a psychological point of view, each requiring a different language for discussion, but with a need to find a common associating language. Machine models which imitate human behavior, but also work internally on the same principles as the brain may afford a way of describing the thinking process and at the same time provide for the objective, physiological aspects of brain function. (*PsyA*, 1955, #201)

91. HIGHER FUNCTIONS OF THE NERVOUS SYSTEM

Malmo, R. B.
Annual Review of Physiology, v. 16, pp. 371–390, 1954

Studies pertinent to the following topics from June 1952 to June 1953 were reviewed: structural basis for learning; reactive inhibition; drive and reinforcement; anxiety considered as a drive; anxiety in relation to the sleep-waking continuum and the general problem of levels of consciousness; physiological recording in conditioning, learning, and attentive states; effect of early

experiences on adult learning; responses evoked in the waking cat by electrical stimulation of the motor cortex; and behavior deviations. 160 references. (*PsyA*, 1955, #203)

92. A NOTE ON THE LIMITATIONS OF EXTERNALISM

Howarth, E.

***Australian Journal of Psychology*, v. 6, pp. 76–84, 1954**

By externalism the author means all attempts by psychologists to circumvent knowledge of internal processes or merely to infer such processes from overt behavior. While externalism, as represented in Skinner's approach, is more ambitious than the internal approach in attempting to predict, it is less successful as an explanatory technique. Several suggestions are given regarding internal changes which might profitably be studied in connection with animal behavior studies. 25 references. (*PsyA*, 1955, #4864)

93. COMMENTS ON HOWARTH'S CRITIQUE OF HULL'S BEHAVIOUR SYSTEMS

Champion, R. A.

***Australian Journal of Psychology*, v. 6, pp. 186–190, 1954**

The author defends Hull against Howarth's charge that Hull has described psychological phenomena *in vacuo* and failed to take into consideration all of the relevant neurophysiological and biochemical data. It is argued that, within the context of his system, "Hull's use of physiological terms is both unnecessary and misleading." Specific Hullian postulates are also discussed briefly. (*PsyA*, 1956, #36)

94. THE PSYCHOLOGICAL STUDY OF CONCEPTUAL THINKING

Hearnshaw, L. S.

***British Journal of Psychology*, v. 45, pp. 1–6, 1954**

The historical antecedents of the current interest in conceptual thinking are examined. Five main problem areas are then identified and discussed. 27 references. (*PsyA*, 1954, #7197)

95. TECHNOLOGICAL MODELS OF THE NERVOUS SYSTEM

Rapoport, A.

***ETC: A Review of General Semantics*, v. 11, pp. 272–283, 1954**

(Also appears in *Methodos*, v. 25–26, pp. 131–146, 1955)

Until relatively recent times, intellectual models tended to reflect powerful concepts from classical mechanics (e.g., force, energy). At present, an intellectual revolution presents the powerful concept of quantity of organization. By analogy, four "technological phyla" may be defined: (1) Tools, extending limbs, transmitting force. (2) Clockworks, using stored stress energy. (3) Heat engines, transforming other kinds of energy to mechanical. (4) Informational machines, designed to store and utilize instructions to perform in certain ways and to receive and analyze additional information, etc. Each such phylum has implied certain analogies to human structures and functions. Behavior of the nervous system may be analyzed in the light of new concepts touching information, entropy, statistics, etc. (*PsyA*, 1955, #5054)

96. THE NEED FOR A FRAME OF REFERENCE IN THE STUDY OF BEHAVIOR

Muenzinger, K. F.

***Journal of General Psychology*, v. 50, pp. 227–236, 1954**

The interdependence of processes within a psychological situation requires a methodological approach for the analysis of behavior that takes into account all the relations between the various parts. Such an approach has to satisfy the main characteristic of behavior, namely its totality which, however, can only be described in dividing it into parts. An applicable method would be the adoption of a pattern of segments which is to be applied universally to all samples of behavior. This "frame of reference" would have the following four categories of description: motivation, discrimination, performance, and affectivity. The meaning of these concepts is discussed. (*PsyA*, 1955, #3257)

97. DOES HULLIAN THEORY PROVIDE THE ADEQUATE FOUNDATIONS FOR A COMPREHENSIVE THEORY OF HUMAN BEHAVIOR?

Ginsberg, A.
Journal of General Psychology, v. 51, pp. 301–330, 1954

Hullian theory is analyzed and criticized. It is concluded that if the analysis and criticism are correct and cogent, Hullian theory cannot deal competently with the so-called higher mental functions, especially in humans. Reasoning or inquiry behavior cannot be explained by Hullian principles. 41 references. (*PsyA*, 1956, #1838)

98. BREAKING OSCILLATIONS IN SERVO SYSTEMS

Vogel, T.
Journal of Mental Science, v. 100, pp. 103–113, 1954

Mathematical description of the dynamics of the brain is complex. The main properties of the system whose variables are continuous are described and some properties of the system with a few discontinuities, including the sudden and apparently spontaneous change in such a system, even if strictly determinate. (*PsyA*, 1955, #211)

99. TOWARD A THEORETICAL BRAIN-MODEL

Precker, J. A.
Journal of Personality, v. 22, pp. 310–325, 1954

The author first considers four current points of view, three of which are neurophysiological in nature: Krech, dynamic systems; Hebb, phase-sequences; Wiener, cybernetics; and Coutu, tendency-in-situation (tinsit). Then a brain-model following mainly the theory of Hebb is constructed. It is finally concluded that, "No scientific endeavor can flourish without a workable theoretical framework, one always open to revision. Theoretical frameworks (say of a molar and molecular nature) need be at least complementary, not contradictory. Psychology will have taken long strides forward when its many partial theories have been related meaningfully in a 'unified field theory'." (*PsyA*, 1955, #41)

100. DEVELOPMENTAL THEORY APPLIED TO NORMAL AND PSYCHOPATHOLOGICAL PERCEPTION

Phillips, L. and Framo, J. L.
Journal of Personality, v. 22, pp. 464–474, 1954

The basic developmental law—that behavior proceeds from an undifferentiated response to the total stimulus pattern, through a process of selective attention to parts, and finally to a synthesis characterized as definite, discrete, and articulated, has been supported by the data presented here. 23 references. (*PsyA*, 1955, #1952)

101. THEMES NOUVEAUX DE PSYCHOLOGIE OBJECTIVE: L'HISTOIRE: LA CONSTRUCTION, LA STRUCTURE (NEW TOPICS OF OBJECTIVE PSYCHOLOGY, HISTORY, PROCESS, STRUCTURE)

Meyerson, I.
Journal de psychologie normale et pathologique, v. 47–51, pp. 3–19, 1954

The author traces the fundamental problems of the psychology of cognition from the beginning of the century to the present. Studies of learning, thinking, perception and language are briefly reviewed in their historical setting, with special emphasis on the Würzburg school, the predecessors of Gestalt psychology and Gestalt psychology itself. Present day trends are discussed. 47 references. (*PsyA*, 1955, #6900)

102. QUELQUES ASPECTS DE LA PSYCHOLOGIE DE LA PENSEE: RECHERCHES THEORETIQUES ET EXPERIMENTALES CONTEMPORAINES (SOME ASPECTS OF THE PSYCHOLOGY OF THINKING: CONTEMPORARY THEORETICAL AND EXPERIMENTAL STUDIES)

Bresson, F.
Journal de psychologie normale et pathologique, v. 47–51, 109–129, 1954

After a brief historical review of experiments on thinking, from Wurzburg to Wertheimer, the author discusses models and methods which have been utilized. He pleads for developmental studies of thought processes. 25 references. (*PsyA*, 1955, #6888)

103. CYBERNETIQUE ET PSYCHOLOGIE: II. MACHINES ET SYSTEMES PHYSIQUES (CYBERNETICS AND PSYCHOLOGY: II. MACHINES AND PHYSICAL SYSTEMS)

Guillaume, P.
Journal de psychologie normale et pathologique, v. 47–51, pp. 486–499, 1954

In this sequel to his earlier review (see *PsyA*, 1955, #8167) the author defines and compares machines and homeostats. The precise implications of each of these two types of physical systems must be understood when one or the other is to be considered as a model for brain function and/or behavior. (*PsyA*, 1956, #10)

104. CLARIFICATION OF AN AMBIGUITY IN HULL'S PRINCIPLES OF BEHAVIOR

Clancy, J. J., Clifford, L. T., and Calvin, A. D.
Psychological Bulletin, v. 51, pp. 583–584, 1954

Corollary VII of the "Principles of Behavior" is ambiguous in that the use of "coarse" and "fine" as descriptive of reinforcement delay ratios, is incompatible with earlier and later parts of the text. However, since a study by Anderson is cited as supporting the corollary, reference to the data resolves the ambiguity. A clarified version of the corollary is presented. (*PsyA*, 1956, #37)

105. KANTTEKENINGEN BIJ DE THEORIE VAN SELZ (MARGINAL NOTES CONCERNING THE THEORY OF SELZ)

de Groot, A. D.
Nederlands Tijdschrift voor Psychologie, v. 9, pp. 114–148, 1954

The rebuttal of the criticisms offered by Van Parreren against the thought-theories of Selz and de Groot. The method of "closed theory" in the psychology of thought is discussed in connection with the problem of experimental and theoretical approach. The terminological problem of the subconscient and the conscient aspects of thinking is stressed. Finally, the importance of the frame of reference offered by the theory of Selz is discussed. 26 references. (*PsyA*, 1955, #3634)

106. DAS PROBLEM DES FUNKTIONALEN DER INTELLIGENZ. ZU EINEM NEUEN TEST: "PROGRESSIVE MATRICES" VON I. C. RAVEN, M.Sc., DUMFRIES (THE PROBLEM OF THE FUNCTIONAL ASPECT OF INTELLIGENCE. ON A NEW TEST: "PROGRESSIVE MATRICES" BY I. C. RAVEN, M.Sc., DUMFRIES)

Seeger, E.
Psychologische Rundschau, v. 5, pp. 127–135, 1954

The method of the test procedure of Raven's Progressive Matrices and its results are discussed first. In the second section dealing with judgment and thinking as intelligence functions, Raven's definition of intelligence is analyzed. It is emphasized that intelligence is not only a capacity but it has to come to the fore and without stimulus. The third section concerns sympathy as a function of intelligence. (*PsyA*, 1956, #2920)

107. LA CYBERNETIQUE (CYBERNETICS)

Guilbaud, G. T.
Presses Universitaires de France, Paris, 1954

The author presents: (1) what he calls the project of an article on cybernetics for the encyclopaedia, (2) problems of servomechanisms, nets and circuits, devoting a separate section to the homeostat of Ashby, (3) the theory of information ("Signals and Messages"), and (4) remarks on the theory of games and some general problems of cybernetics. 27-item bibliography. (*PsyA*, 1957, #21)

108. PREHLED UCENI I. P. PAVLOVA O VYSSI NERVOVE CINNOSTI (A REVIEW OF THE PAVLOV'S THEORY OF HIGHER NERVOUS ACTIVITY)

Hrbek, Jaromir and Hrbek, Jan
Státni pedagogické nakladatelstvi, Prague, 1954

This is Part II of the university textbook of the experimental and clinical pathophysiology of the nervous system. Part I deals with the life and work of Pavlov, ideological sources of his views, main principles of his theory of the physiology of the nervous system, and his method of investigation. Part II is devoted to the physiology of the higher nervous activity, and Part III to the pathophysiology of the higher nervous activity. (*PsyA*, 1956, #1180)

109. THE CAMBRIDGE CONFERENCE ON THINKING

Cronbach, L. J.
September 8, 1955

Office of Naval Research, London
Technical Report ONRL-86-55
ASTIA AD-75,470

110. RESEARCH AT GENEVA ON INTELLECTUAL DEVELOPMENT
Cronbach, L. J.
December 22, 1955
Office of Naval Research, London
Technical Report ONRL-120-55
ASTIA AD-86,295

111. PERMEABILITY: A DIMENSION OF CONCEPTUAL BEHAVIOR
Mitsos, S. B.
1955
Purdue University, Lafayette, Ind.
Thesis

112. COMPLEX INTERMEDIATE PROCESSES BETWEEN SITUATION AND RESPONSE: THEIR METHODOLOGICAL IMPLICATIONS
Leeper, R.
Acta Psychologica, v. 11, pp. 110–111, 1955

113. THE CONJUNCTIVE, DISJUNCTIVE, AND COMPENSATORY MODELS FOR COMPLEX BEHAVIOR
Coombs, C. H.
Acta Psychologica, v. 11, pp. 154–155, 1955

114. INFORMATION, ASSOCIATION AND INTERACTION
McGill, W. J.
Acta Psychologica, v. 11, pp. 203–204, 1955

115. PATTERNS OF INDUCTIVE THINKING
Inhelder, B.
Acta Psychologica, v. 11, pp. 217–218, 1955

116. ORGANIZATION IN EMOTIONAL AND MOTIVATED BEHAVIOR
Bindra, D.
Canadian Journal of Psychology, v. 9, pp. 161–167, 1955

The organization-disorganization variable is defined as a general dimension of behavior, and refers to the extent to which the organism's behavior consists of either a stable sequence of responses or responses that lead to a stable outcome, or both. So interpreted, neither motivated nor emotional behavior can be identified with either organized or disorganized behavior. Both organized emotional behavior and organized motivated behavior develop from unorganized general excitement. The Young-Leeper controversy is discussed in terms of this analysis of the organization variable. (*PsyA*, 1956, #3673)

117. COGNITIVE STRUCTURE AND COGNITIVE TUNING
Zajonc, R. B. (University of Michigan, Ann Arbor, 1955, Thesis)
Dissertation Abstracts, v. 15, p. 894, 1955

118. A MODEL FOR STUDYING THE VALIDITY OF MULTIPLE-CHOICE ITEMS
Cronbach, L. J. and Merwin, J. C.
Educational and Psychological Measurement, v. 15, pp. 337–352, 1955

A mathematical model is developed for studying the validity of multiple-choice items. Theory regarding the multiple-choice items is discussed laying a basis for needed studies of the properties affecting item efficiency, such as the closeness of alternatives, various modifications of the best-answer technique, etc. The calculations needed for three different cases in the use of the model are described. (*PsyA*, 1956, #6523)

119. NEW LIGHT ON THE BRAIN
Bello, F.
Fortune, v. 51, pp. 104–107, 122–133, 1955

Nontechnical discussion of the brain as ". . . the greatest enigma of modern science." New knowledge of the brain in the last 25 years include three major developments: (1) A new theory of consciousness has been elab-

orated. (2) The cerebral has been found to be surprisingly expendable. (3) Mathematical models "explain" how the brain works. Several contemporary and recent investigators in neurophysiology were mentioned including Sherrington, Adrian, Hughlings Jackson, Berger, Jasper, etc., and their contributions noted. (*PsyA*, 1955, #6583)

120. TOWARD A GENERAL THEORY OF BEHAVIOR

George, F. H. and Handlon, J. H.
***Methodos*, v. 25–26, pp. 25–44, 1955**

A general skeleton theory of behavior is outlined which attempts to give a molar account of learning, and the beginning of perception. The theory is a linguistic framework within which the physiological and philosophical facts should be given an interpretation. It is intended especially as a datum line for cybernetic and logical research. The theory is essentially of an expectancy kind. (*PsyA*, 1956, #7908)

121. AN INTRODUCTION TO THE APPLICATION OF BOOLEAN ALGEBRA TO PSYCHIATRY

Dale, P. W.
***Psychiatric Quarterly*, v. 29, pp. 48–59, 1955**

Recent mathematical developments make it no longer necessary to rely on the unaided thought processes in the solution of psychiatric problems. Scientific psychiatry has reached the point where mathematical instruments are necessary. The calculus proposed by George Boole (1854) provides a method for the solutions of the non-numerical problems of psychiatry. The operations of Boolean algebra correspond to the operations of the nervous system. (*PsyA*, 1956, #1893)

122. TECHNOLOGICAL MODELS OF THE NERVOUS SYSTEM

Rapoport, A.
***Psychiatric Research Reports*, no. 2, pp. 119–131, 1955**

Historically the technological analogies purporting to explain the behavior of living things have been geared to prevailing technological concepts. We are now entering a new technological era—the era of "intelligent machines" called automata and servomechanisms. The understanding of the principles on which these machines are constructed and operate promises to extend our understanding of the living process still further. One illustration given is the study of communication nets from the information-theoretical point of view. (*PsyA*, 1957, #184)

123. DRIVES AND THE C.N.S. (CONCEPTUAL NERVOUS SYSTEM)

Hebb, D. O.
***Psychological Review*, v. 62, pp. 243–254, 1955**

It is held that many of the current problems in the field of motivation arise from the acceptance of a conceptual nervous system of an earlier day. To develop this thesis, the author examines the concept of motivation as it relates to the conceptual nervous systems of the period before 1930, of the period ten years ago, and of today. It is shown that today's physiology provides common ground for communication among the differing conceptions of motivation. 51 references. (*PsyA*, 1956, #1839)

124. PRINCIPLES OF PERFORMANCE

Tolman, E. C.
***Psychological Review*, v. 62, pp. 315–326, 1955**

The author extends with modifications his earlier cognitive learning position so as to more clearly delineate the performance principles of the system. He begins by setting forth his basic assumptions concerning independent and intervening variables, and then relating them to what is called performances in the behavior space. The analysis is applied to bar-pressing, escape behavior, response combining, and vicarious trial and error. 25 references. (*PsyA*, 1956, #3694)

125. ON THE DESIGN OF AUTOMATA AND THE INTERPRETATION OF CEREBRAL BEHAVIOR

Frankel, S.
***Psychometrika*, v. 20, no. 2, pp. 149–162, 1955**

In principle it is possible to design automata to display any explicitly described behavior. The McCulloch-Pitts

neuron is a convenient elementary component for the control mechanisms of automata. Previously described techniques permit the design of an automaton which would arbitrarily well simulate human behavior. The difficulty of producing such a design lies primarily in formulating an explicit description of the required behavior. The control mechanism of such an automaton would be of very great logical complexity. Its mode of operation probably would not resemble that of a human brain. The brain is more plausibly represented by stochastic models as proposed by Hebb. Such models can more easily be designed or understood by reason of lesser logical complexity. A method of computational investigation of the functioning of such stochastic models is described. Several extremely simple models have been investigated. One is shown to have properties suggestive of learning ability. (*PsyA*, 1956, #1812)

126. CORRELATIONS BETWEEN LEVELS OF PSYCHOLOGICAL AWARENESS AND PHYSIOLOGICAL ACTIVITY IN THE CENTRAL NERVOUS SYSTEM
Heath, R. G.
***Psychosomatic Medicine*, v. 17, pp. 383–395, 1955**

By recourse to chemical, neurophysiological, electrical, and psychoanalytic methods the interrelationships between levels in symbolic activity (abstract and emotional thinking) as evidenced by patients (including the schizophrenic) under stress and nonstress conditions, and recorded activity in the central nervous system are indicated. An hypothesis of "dual-circuit control of thought level," one facilitatory and the other inhibitory, is developed to guide the research program currently making use of personnel from several disciplines. (*PsyA*, 1956, #4163)

127. PSYCHIC CONTENTS AND PROCESSES OF THE BRAIN
Ostow, M.
***Psychosomatic Medicine*, v. 17, pp. 398–406, 1955**

The thesis is developed, with cybernetics as a model, that "for its more elementary functions the central nervous system function may use a digital type of computation ... the data cannot possibly reach consciousness because they are used in an automatic fashion.... However, for the purpose of determining behavior, the brain attempts to predict the outcome of any given course of procedure by means of analogic types of calculation. This computer comprises the whole of the psyche, while consciousness is essentially the point at which the results of the computation are read." The psychic contents of the brain and their processes are then developed by frequent reference to psychoanalytic thought. (*PsyA*, 1956, #3886)

128. MAN VIEWED AS A MACHINE
Kemeny, J. G.
***Scientific American*, v. 192, no. 4, pp. 58–67, 1955**

This report describes the logical working of computing machines in analogy to thinking, and shows that a Turing machine could be programmed to reproduce itself. (*PsyA*, 1956, #2428)

129. IS THE CONCEPT OF AN ORGANISM AS A MACHINE A USEFUL ONE?
Rashevsky, N.
***Scientific Monthly*, v. 80, pp. 32–35, 1955**

If the title question is asked in the form of whether an organism, or a part, is isomorphic to a specified machine the answer is affirmative. Examples of such isomorphism are discussed but the author does not believe that the future of biology lies in emphasis on such relations even though they have usefulness in particular cases. (*PsyA*, 1955, #6480)

130. LA CYBERNETIQUE: DU CERVEAU HUMAIN AUX CERVEAUX ARTIFICIELS (CYBERNETICS: FROM HUMAN BRAIN TO ARTIFICIAL BRAINS)
Cossa, P.
Masson et cie, Paris, 1955

The author covers the history of the origin and development of cybernetics, the methods of comparison of man with the machine, the principle of autoregulation, feedback, feedback principle in the function of cerebellum, and homeostasis, the oscillatory circuits in the pathological physiology, various synthetic animals, automatic calculating machines, the theory of information, social

and economic problems of cybernetics, and criticism of metaphysical extrapolations of cyberneticians. (*PsyA*, 1957, #14)

131. DE LA LOGIQUE DE L'ENFANT A LA LOGIQUE DE L'ADOLESCENT (FROM THE LOGIC OF THE CHILD TO THE LOGIC OF THE ADOLESCENT)

Inhelder, B. and Piaget, J.
Presses Universitaires de France, Paris, 1955

One author presents the development of logic from childhood to adolescence from the point of view of experimental reasoning. The other elaborates the instruments of logistic analysis. The unity of the two views is preserved by the joint interpretation of each example presented. The child confounds the subjective and the objective, and at the level of concrete thought is capable of elementary groupings only. The adolescent though egocentric is idealistic, his affective development paralleling his intellectual acquisition. (*PsyA*, 1955, #7000)

132. THINKING ABOUT THINKING

Wolfard, M. R.
Philosophical Library, Inc., New York, N. Y., 1955

An inquiry is made into the fundamental nature of the thinking process. Genuine thinking is considered a manufacturing process in which the raw materials are concepts and the finished product is a new concept. The process requires the energy of perception to move memories in such a way as to provide a new integration. Instances of skeptical and dogmatic thinking are analyzed in a survey of a number of philosophical, scientific, and religious positions. (*PsyA*, 1956, #6897)

133. BIBLIOGRAPHY OF UNCLASSIFIED RESEARCH REPORTS FOR JULY 1956–JULY 1958

Office of Naval Research, Physiological—Psychological Branch, Washington, D. C.

The two hundred and eighty-one reports in this Bibliography include sensory mechanisms, perception and orientation, neural basis of behavior, response mechanisms and effects of noise.

134. ESSAY ON A REPORT BY ASHBY—AMPLIFIER CIRCUIT OF THOUGHT CAPABILITIES (COLLECTION "AUTOMATA")

Buslenko, N. P.
October 19, 1956
Moscow University Mathematical Computing Faculty Seminar, 1956–1957
To be published in *Problems of Cybernetics*

135. ESSAY ON AN ARTICLE OF VON NEUMANN—PROBABILITY LOGIC AND SYNTHESIS OF RELIABLE ORGANISMS MADE OF UNRELIABLE COMPONENTS—(COLLECTION "AUTOMATA")

Tsetlin, M. L.
December 7, 1956
Moscow University Mathematical Computing Faculty Seminar, 1956–1957
To be published in *Problems of Cybernetics*

136. THE LOGIC OF AUTOMATA

Burks, A. W. and Wang, H.
December 1956
University of Michigan, Engineering Research Institute, Ann Arbor
Report 2512-2-F, OSR-TN-56-539, AF 18(603)72, ASTIA AD-110,358

Three classes of automata are distinguished: fixed and growing, deterministic, and probabilistic. Methods for analysing and synthesizing fixed, deterministic automata by four kinds of state tables are presented. The use of these tables gives a decision procedure for determining whether or not two automaton junctions behave the same. Matrix theory is applied to some of the state tables, and theorems are proved regarding the resulting matrices and a corresponding normal form automaton. Finally, fixed, deterministic automaton nets in terms of cycles are analyzed.

137. DESIGN OF MACHINES TO SIMULATE BEHAVIOR OF HUMAN BRAIN

McCulloch, W. S., Oettinger, A. G., Schmitt, O. H., and Tompkins, H. E.
***IRE Transactions on Electronic Computers*, v. EC-5, no. 4, pp. 240–255, December 1956**

Discussions on following topics: brain considered as computer with negative feedback; contrasts and similarities; simulation of brain action on computers; chemical action, cell assemblies, etc; problems relating to memory; neurophysiologists' contribution; possibilities of creative thinking by machines; consideration of various related matters.

138. TOWARDS AN INFORMATION-FLOW MODEL OF HUMAN BEHAVIOR

MacKay, D. M.

***British Journal of Psychology*, v. 47, pp. 30–43, 1956**

This paper is concerned with the behavior possible in an information-flow system intended explicitly as a hypothetical model for comparison with the information-handling system. A statistically self-organizing system is described in which not only normal homeostatic behavior but also such activities as the invention of fruitful hypotheses, the imagination of fictitious situations, and the like would find a natural place. Discussion is confined mainly to the manner of concept formation and concept handling in such a system. It has been suggested that the correlate of perception (as distinct from reception) is activity which organizes an outwardly directed internal matching response to signals from receptors. This organizing activity amounts logically to an internal representation of the feature in the incoming signals to which it is adaptive, i.e., the feature which is thus "perceived." (*PsyA*, 1957, #2910)

139. IS CONSCIOUSNESS A BRAIN PROCESS?

Place, U. T.

***British Journal of Psychology*, v. 47, pp. 44–50, 1956**

The thesis that consciousness is a process in the brain is put forward as a reasonable scientific hypothesis, not to be dismissed on logical grounds alone.... It is suggested that we can identify consciousness with a given pattern of brain activity, if we can explain the subject's introspective observations by reference to the brain processes with which they are correlated. It is argued that the problem of providing a physiological explanation of introspective observations is made to seem more difficult than it really is by the phenomenological fallacy, the mistaken idea that descriptions of the appearances of things are descriptions of the actual state of affairs in a mysterious internal environment. (*PsyA*, 1957, #2178)

140. MOTRICITE, PERCEPTION ET INTELLIGENCE (MOTIVITY, PERCEPTION AND INTELLIGENCE)

Piaget, J.

***Enfance*, v. 9, no. 2, pp. 9–14, 1956**

141. MOGLICHKEITEN UND GRENZEN EINER NATURWISSENSCHAFTLICHEN BETRACHTUNG DER MENSCHLICHEN BEWEGUNG (POSSIBILITIES AND LIMITS OF A NATURAL SCIENCE VIEW OF HUMAN MOVEMENT)

Christian, P.

***Jahrbuch für Psychologie und Psychotherpie*, v. 4, pp. 346–356, 1956**

Cybernetic models can be used to study problems of human movement like: range of variation within which a particular movement can be executed, how a qualitative shift in form of movement occurs as a function of quantitative increase in speed of movement, and how continuous critical control of movement ensures an integrated outcome. Such models, because of their assumption of directedness, are useful for the study of biological activities, which they mimic in a limited but useful manner. (*PsyA*, 1958, #3741)

142. ON THE UNITY OF THOUGHT AND BELIEF

Rokeach, M.

***Journal of Personality*, v. 25, pp. 224–250, 1956**

A thought-belief model, which contains three dimensions, is presented. The dimensions are the belief–disbelief dimension, the central-peripheral dimension, and the time-perspective dimension. Each of these dimensions has additional properties. But the whole belief–disbelief system should be measured quantitatively along a single dimension. Furthermore, it is assumed that these three dimensions and their properties are all intercorrelated to the extent that they are reducible to a single dimension, namely, organization along an open-to-closed dimension. The model is currently being put to a test to determine its workability. 69 references. (*PsyA*, 1958, #261)

143. THE NEED FOR A NEW THEORY OF THOUGHT

Ball, R. S.

Merrill-Palmer Quarterly, v. 2, pp. 164–172, 1956

Psychologists have long neglected the use of introspective methods as a means of studying the mind or thought in the making. Philosophers and psychoanalysts have suggested a new hypothesis of the "mind-stuff or mental energy which extends as a continuum of thought throughout the universe." Many theoretical questions are raised: How does thought exist independent of its manifestation? What is its natural state? Is it magnetic in nature? Several avenues of investigation are suggested. (*PsyA*, 1957, #4358)

144. HUMAN BEHAVIOR: CAPACITY, COMMUNICATION, AND CONTROL

Bachrach, A. J., Banghart, F. W., and Pattishall, E. G.

Neuropsychiatry, v. 4, pp. 59–79, 1956–1957

145. BIBLIOGRAPHY ON COGNITIVE PROCESSES: I. CONSCIOUSNESS, II. CREATIVITY-INVENTION, III. DREAMS, IV. CONCEPTS

Mayzner, M. S.

Psychological Newsletter, New York University, v. 7, pp. 92–102, 1956

146. BIBLIOGRAPHY ON COGNITIVE PROCESSES: V. INTUITION, VI. SYMBOLS, VII. SET-RIGIDITY, VIII. IMAGINAL PROCESSES—FANTASY, IX. EMOTIONS

Mayzner, M. S.

Psychological Newsletter, New York University, v. 7, pp. 121–132, 1956

147. BIBLIOGRAPHY ON COGNITIVE PROCESSES: X. THINKING—THOUGHT

Mayzner, M. S.

Psychological Newsletter, New York University, v. 8, pp. 12–18, 1956

148. BIBLIOGRAPHY ON COGNITIVE PROCESSES: XI. JUDGMENT

Mayzner, M. S.

Psychological Newsletter, New York University, v. 8, pp. 33–36, 1956

149. ON THOUGHT: THE EXTRINSIC THEORY

Galanter, E. and Gerstenhaber, M.

Psychological Review, v. 63, pp. 218–227, 1956

"We have suggested that thought consists in modeling the environment and using the method to predict the future state of the world. . . . By introducing the idea of a payoff function, we can control the motivational input to the organism, and so increase the likelihood of having its insights manifested in action. We then proposed an hypothesis relating *S-R* behavior and insightful behavior, and described some scraps of evidence in its support. Finally we pointed to the need for an independent measure of 'problem complexity' before we could get to the critical problem of the relation between the motivational structure of the person and the characteristics of the insight he reveals." (*PsyA*, 1957, #3995)

150. AN INTRODUCTION TO CYBERNETICS

Ashby, W. R.

John Wiley & Sons, New York, N. Y., 1956

The basic ideas of cybernetics are presented without reference to electronics and without assuming any knowledge of mathematics beyond elementary algebra. Since the book is directed at workers in the biological sciences, most illustrations are taken from physiology, psychology and sociology. After defining cybernetics as the study of systems that are open to energy but closed to information and control, Part I deals with the main properties of a machine. Part II deals with information theory, while Part III treats regulation and control. (*PsyA*, 1957, #1962)

151. A STUDY OF THINKING

Bruner, J. S., Goodnow, J. J., and Austin, G.

John Wiley & Sons, New York, N. Y., 1956

The first three chapters discuss the nature of categorizing activity and its relation to inferential and cognitive activity in general. Concept attainment is defined as the process of finding attributes which define exemplars of

categories. Chapters four to seven report the results of some 20 experiments concerned with the conditions of concept attainment. In particular, the effect of "selection strategy" (the order in which hypotheses are tested), and "reception strategy" (the procedure of interpreting tests of hypotheses) is investigated, as well as the behavior of subjects in attaining "disjunctive" concepts and in learning to categorize when the cues are probabilistic rather than all-or-none. There is an appendix on language and categories by Roger W. Brown. 220-item bibliography. (*PsyA*, 1957, #582)

152. THE COGNITIVE PROCESS
Karwoski, T. F.
In "Present-Day Psychology," Robach, A. A., Editor
Philosophical Library, New York, N. Y., 1956,
pp. 77–102

Cognition is analyzed in terms of the symbolic process "in order to organize cognitive material and at the same time to point up critical issues." 34 references. (*PsyA*, 1956, #2427)

153. THE EPISTEMOLOGICAL PROBLEM FOR AUTOMATA
MacKay, D. M.
In "Automata Studies," Shannon, C. E. and McCarthy, J., Editors
Princeton University Press, Princeton, N. J., 1956

154. CHILDREN'S THINKING
Russell, D. H.
Ginn & Company, Boston, Mass., 1956

In an attempt to study a specific area of child development more deeply than do general tests, this book integrates certain developmental facts with the body of knowledge of educational psychology and applies them to schoolwork and intellectual development. Research findings in these areas are synthesized into a possible structure, especially from the developmental point of view, for the psychology of thinking. The book is divided into sections entitled: "Backgrounds of Children's Thinking," "The Materials of Children's Thinking," "The Processes of Children's Thinking," and "The Improvement of Children's Thinking." 36-page bibliography. (*PsyA*, 1957, #2523)

155. ELECTRICAL SIMULATION OF SOME NERVOUS SYSTEM FUNCTIONAL ACTIVITIES
Taylor, W. K.
Proceedings of the Third Symposium on Information Theory, Royal Institution, London, September 12–16, 1955
In "Information Theory," Cherry, C., Editor
Academic Press, New York, N. Y., 1956,
pp. 314–328

156. TIPOLOGICHESKIE OSOBENNOSTI VYSSHEI NERVNOI DEIATEL'NOSTI CHELOVSKA (TYPOLOGICAL FEATURES OF HIGHER NERVOUS ACTIVITY IN MAN)
Teplov, B. M., Editor
Akademia Pedagogicheskikh Nauk, RSFSR, 1956

Demonstrating progress made toward the merger of psychology and cerebral physiology, 14 articles are exhibited, of which one by Teplov is an exhaustive survey of the relevant Soviet literature, 12 are experimental studies, and one an observational piece. 265 references. (*PsyA*, 1959, #264)

157. IVAN P. PAVLOV; TOWARD A SCIENTIFIC PSYCHOLOGY AND PSYCHIATRY. PAVLOV AND FREUD: I.
Wells, H. K.
International Publishers, New York, N. Y., 1956

This volume "is an attempt to introduce the reader to those teachings of Ivan P. Pavlov which are pertinent to the fields of psychology and psychiatry." Although not a finished science as yet, there are enough generalizations about the physiology of the higher nervous activity to make a convincing case. The author argues that in order to be fully experimental, psychology and psychiatry must be firmly rooted in the physiology of the brain. He is impressed with the evidence for Pavlov's position. (*PsyA*, 1957, #1988)

158. ELECTRICAL MODELLING OF CERTAIN MENTAL WORK PROCESSES, USING INFORMATION MACHINES WITH LARGE INTERNAL STORAGE
Gutenmakher, L. I.
Technical Conference held May 28–31, 1957, at the Electro-modelling Laboratory of the USSR Academy of Sciences
Report I. Plenary Sessions

159. LOGIC OF AUTOMATA
Burks, A. W. and Wang, H.
Journal of the Association for Computing Machinery, Part I, v. 4, pp. 193–218, April 3, 1957; Part II, v. 4, pp. 279–297, July 1957

This article discusses the following: the use of logical systems and techniques in analysis of automata, particularly digital computers and nerve nets; a new kind of automaton, i.e., growing automaton, of which Turing machines and self-duplicating automata are special cases; methods of analyzing these automata in terms of their states; four kinds of state tables; how information in state tables can be expressed in matrix form, and how to decompose net into subnets. (*EI*, 1958, p. 226)

160. HUMAN BEINGS AS COMPUTERS: BIOLOGICAL COMPUTERS
McCulloch, W. S.
IRE Transactions on Electronic Computers, v. EC-6, no. 3, pp. 190–192, September 1957

161. COMPLEXITY OF BIOLOGICAL COMPUTERS
Quastler, H.
IRE Transactions on Electronic Computers, v. EC-6, no. 3, pp. 192–194, September 1957

162. MODELS AND THEORY CONSTRUCTION
Beshers, J. M.
American Sociological Review, v. 22, pp. 32–38, 1957

A call for a de-emphasis on the role of the mathematical model in theory construction in the behavioral sciences, and a discussion of possible alternatives. (*PsyA*, 1958, #13)

163. BRAIN AND CONSCIOUSNESS: SOME PROLEGOMENA TO AN APPROACH OF THE PROBLEM
Kuhlenbeck, H.
Confina Neurologica, v. 17, Supplement IV, 1957

Contains three main sections entitled: The Materialistic Approach; The Idealistic Approach; Postulational Psychophysical Parallelism; and an appendix: synopsis of the fundamental epistemic argument. 413-item bibliography. (*PsyA*, 1958, #4754)

164. FORMAL AND CONCRETE THOUGHT PROCESSES
Keats, J. A. (Princeton University, N. J., 1955, Thesis)
Dissertation Abstracts, v. 17, p. 1382, 1957

165. OF MODELS AND MEN
Estes, W. K.
American Psychologist, v. 12, pp. 609–617, 1957

"Although already too complicated for the average psychologist to handle . . . [theories of learning] are not yet adequate to account for the behavior of a rodent on a runway." A mathematical model is proposed and considered in terms of certain empirical data. Game theory is also considered. A mathematical model emerges which then has a guiding role in the planning and interpretation of further experiments. Correspondences between properties of the model and properties of human behavior are sought as both model and man are "confronted with a series of increasingly novel and complex learning situations." The writer has "found that the steepest obstacle to theory construction in psychology is not the complexity of behavior." Rather it is a combination of centuries of prescientific stereotypes and "the pronouncements of the academicians who have always known in advance, apparently by divine inspiration, exactly what kind of theory is possible and proper for psychology." Experimental subjects will indicate through their behavior to what kind of theory psychology is entitled. (*PsyA*, 1959, #3118)

166. KIBERNETIKA V BIOLOGII (CYBERNETICS IN BIOLOGY)
Menitskii, D. N.
***Biofizika*, v. 2, pp. 129–141, 1957**

The chief possibilities of applying cybernetics in biology are presented and linked to Pavlovian conceptions. (*PsyA*, 1958, #3461)

167. K OTAZCE FYSIOLOGICKEHO VYKLADU MYSLENI (PROBLEM OF THE PHYSIOLOGICAL INTERPRETATION OF THINKING)
Tardy, V.
***Ceskoslovenská Psychologii*, v. 1, pp. 4–24, 1957**

An attempt to harmonize psychological interpretation with physiological and logical data in the light of Pavlov's conception of the second signal system: the connection of nervous activity and logical operations, the signal function of the word, the origin of concepts, the analysis of concepts, general judgment and contradictions, the analysis of logical rules, the interpretation of problem solving. Russian and English summaries. (*PsyA*, 1959, #9911)

168. PSYCHOLOGISTS' ATTITUDES ON PSYCHOLOGICAL ISSUES: II. STATIC-MECHANICAL-ELEMENTARISM
Morrow, W. R.
***Journal of General Psychology*, v. 57, pp. 69–82, 1957**

"The article deals with a . . . study of 'static-mechanical-elementarism' as opposed to a 'dynamic-holistic' approach. This opposition embraces three interrelated polarities in ways of analyzing causal relations: (1) mechanical vs. dynamic conceptions; (2) elementaristic vs. holistic conceptions; and (3) static vs. dynamic conceptions of psychological processes. It was hypothesized that psychologists' beliefs on issues involving these polarities will tend to reflect a general point of view varying in degree, rather than a set of unrelated opinions." The results as measured by a Likert-type scale, the SME Scale, tended to support the hypothesis. (*PsyA*, 1959, #7212)

169. SOME STRUCTURAL ASPECTS OF CONCEPTS
Richter, M. N., Jr., Lehman, R. A., and Stillman, R. C.
***Journal of Psychology*, v. 44, pp. 305–310, 1957**

This is a theoretical analysis of conceptual processes which the authors divide into three classes: (1) abstract, consisting in objects possessing a stipulated defining attribute or criterion of membership; (2) pseudo-abstract thought involving imperfectly structured classes, such as citing a few cases and then implying invariability; and (3) preconceptual thinking characterized by judging that two objects alike in one particular are identical, or as totally dissimilar if they differ in any respect. (*PsyA*, 1959, #9910)

170. DIE AFFECTIV-VEGETATIVE KOMMUNIKATION (VERSUCH EINER PSYCHOSOMATISCHEN THEORIE DER VITALEN STIMMUNG) [AFFECTIVE-VEGETATIVE COMMUNICATION. (AN ATTEMPT TO FORMULATE A PSYCHOSOMATIC THEORY OF "VITAL MOOD")]
von Ditfurth, H.
***Nervenarzt*, v. 28, pp. 70–80, 1957**

This is the first half of a discussion on the German literature and the author's own speculations on the relationship between sense organs, perception and affect, and vegetative responsiveness. Higher and lower senses are distinguished. The former (primarily seeing and hearing) facilitate mainly perception, whereas the latter are more closely related to feelings, drives, affect and mood, and are inseparable from psychophysiological reactions of the autonomic nervous system. The lower senses are viewed as phylogenetically more primitive ways of "communication." (*PsyA*, 1958, #2434)

171. CYBERNETICS: A REVIEW OF WHAT IT MEANS AND SOME OF ITS IMPLICATIONS IN PSYCHIATRY
Crider, D. B.
***Neuropsychiatry*, v. 4, pp. 35–58, 1956–1957**

Reviewed is the general problem of communication in therapy, the significance of information theory in psychiatry, some relations between concepts of cybernetics and controls to problems of neurotic patients and to certain aspects of the functioning of the nervous system. (*PsyA*, 1958, #4735)

172. PSYCHOANALYSE ET CYBERNETIQUE (PSYCHOANALYSIS AND CYBERNETICS)
Delpech, L.
Proceedings of the XIth International Congress on Philosophy, v. 7, pp. 155–161, 1953

An essay devoted to the review and comparison of various facts and views concerning the analogies between cybernetics and psychoanalysis. (*PsyA*, 1955, #1722)

173. DAS ZWEITE SIGNALSYSTEM UND SEINE BEDEUTUNG FÜR DIE ZENTRALE REGULATION DER FUNKTIONEN DES ORGANISMUS (THE SECOND SIGNAL SYSTEM AND ITS SIGNIFICANCE FOR THE CENTRAL REGULATION OF THE ORGANISM'S FUNCTIONS)
Pickenhain, L.
Psychiatrie, Neurolgie und medizinische Psychologie, Leipzig, v. 9, pp. 203–210, 1957

Pavlov's teaching of higher nervous system activity provides the methodology for the analysis of man's psychic functioning. Unexceptionally determined, psychic processes represent man's highest phylogenetic development. They should not be reduced to somatic processes because "they represent a qualitatively new functional manifestation of higher nervous system activity." (*PsyA*, 1959, #253)

174. MATHEMATICAL LOGIC AND THE NATURE OF REASONING
Dale, P. W.
Psychiatric Quarterly, v. 31, pp. 1–9, 1957

The basic mathematical postulates have a strictly human origin. Mathematics is a method for manipulating any ideas. Theorems are discovered by a primitive, nonlogical mental process and are communicated to others by deductive reasoning. The reasoning "canned" in mathematics is as applicable to psychiatry as to any other science. Mathematical techniques may catalyze psychiatry to great advances. (*PsyA*, 1958, #2253)

175. BIBLIOGRAPHY ON COGNITIVE PROCESSES: XII. PROBLEM-SOLVING
Mayzner, M. S.
Psychological Newsletter, New York University, v. 8, pp. 77–82, 1957

176. BIBLIOGRAPHY ON COGNITIVE PROCESSES: XIII. PERCEPTION
Mayzner, M. S.
Psychological Newsletter, New York University, v. 8, pp. 94–111, 1957

177. BIBLIOGRAPHY ON COGNITIVE PROCESSES: XVI. LOGIC. XVII. ASSOCIATIONS
Mayzner, M. S.
Psychological Newsletter, New York University, v. 9, pp. 63–69, 1957

178. RECENCY, FREQUENCY, AND PROBABILITY IN RESPONSE
Overall, J. E. and Brown, W. L.
Psychological Review, v. 64, pp. 314–324, 1957

179. APPLICATION D'UN MODELE TOPOLOGIQUE A L'ETUDE DU MORAL (USE OF A TOPOLOGICAL MODEL IN STUDYING PURPOSIVE ACTION)
Chandessais, Ch.
Travail Humain, v. 20, pp. 8–29, 1957

Using an abstract model forces the researcher to formulate his hypotheses very carefully, and to manipulate his variables more easily than to use real objects. Six independent variables are introduced: common elements, order of elements within the structure, hierarchic network, network of spontaneous communications, and two laws of deterioration. English summary. (*PsyA*, 1959, #30)

180. Z BADAN NAD MYSLENIEM: ROZUMIENIE ZDANIA (FROM THE INVESTIGATIONS FOR THINKING: THE UNDERSTANDING OF A SENTENCE)
Szewczuk, W.
Zestawienie Nauk Jagieleonskiego Psychologii Pedagogicznej, v. 1, pp. 59–135, 1957

This paper is a report on a part of a comprehensive experimental investigation of a thinking process in which the author used a method which he calls linguistic-

statistical. The process of the understanding of a complex sentence proceeds through the separation of the less essential components from the more essential ones and through the development of the cognition of their relations. The course of this process is determined by the linguistic structure of the sentence, by the amount of knowledge possessed by the person perceiving the sentence, by its receptive efficiency and by its memory. English and Russian summaries. (*PsyA*, 1959, #3266)

181. ITOGI ISSLEDOVANII PO PROBLEMAM FIZIOLOGICHESKOGO UCHENIIA I. P. PAVLOVA (SUMMARY OF STUDIES ON THE PROBLEMS OF THE PHYSIOLOGICAL THEORY OF I. P. PAVLOV)
Pavlov, B. V. and Vediaev, F. P.
***Zhurnal Vysshei Nervnoi Deiatelnosti*, v. 7, pp. 318–324, 1957**

Summaries are provided of major papers read at the November 1956 meeting in Leningrad of the 17th conference on problems of Pavlov's physiological theory. While commendatory remarks are made on the level of research maintained in the reported studies, it is pointed out, however, that few physiological investigations in the USSR are being carried out in collaboration with morphologists and biochemists, that contemporary apparatus is being insufficiently utilized, and that relatively little is being done in the way of "studying the role of various subcortical formations in higher nervous activity." (*PsyA*, 1959, #2616)

182. THE HUMAN BRAIN; FROM PRIMITIVE TO MODERN
Lassek, A. M.
Charles C. Thomas, Publisher, Springfield, Ill., 1957

This book is a non-technical attempt to relate the human brain to behavior, the behavioral data being largely derived from anthropological and historical sources. The first quarter of the book is devoted to a rapid review of the development of knowledge about the brain and to "highlights of normal human brain" together with some comparative material. The remainder of the book deals with the evolution of mind through "savage" to "barbarian" to "the civilized mind." (*PsyA*, 1958, #93)

183. IMAGINATION AND THINKING: A PSYCHOLOGICAL ANALYSIS
McKellar, P.
Basic Books, New York, N. Y., 1957

An analysis of autism and reality-adjusted thinking—addressed to the scientist, artist, and layman—which describes the diversity of human thought and which may assist in the appreciation and understanding of the thinking of psychotic persons. Dreams and imagery, and mystical and pathological thinking, as well as creative and scientific thinking, are discussed. Glossary and 157-item bibliography. (*PsyA*, 1958, #258)

184. STRUCTURE, FUNCTION AND PURPOSE: AN INQUIRY INTO THE CONCEPTS AND METHODS OF BIOLOGY FROM THE VIEWPOINT OF TIME
Moulyn, A. C.
Liberal Arts Press, New York, N. Y., 1957

The author supports the position that "a mechanistic theory of man is neither complete nor scientific, because it does not take man's specific time structure into account and, moreover . . . does not explain the purposive behavior of sane animals." He presents a "dualistic theory of behavior in a negative sense, namely, that the relationship between the nervous system and purposive movement cannot be a causal nature." While structure and function are not purposive, there are purposive phenomena emerging from the capacity to integrate objective and subjective time. (*PsyA*, 1959, #2613)

185. CYBERNETICS, A SPECIAL SUBJECT LIST
Taylor, F. R.
April 1957
The Library Association, Great Britain
Subject List-17

A book and journal reference list is given.

186. THE NATURE OF CREATIVE THINKING: A MONOGRAPH
Olsen, F., et al.
New York University Press, N. Y., 1957

This monograph presents the report of a symposium on creative thinking sponsored by the Industrial Research

Institute. The authors and topics are as follows: Fred Olsen, Introduction and Summary; H. J. Rand, Creativity, Its Social, Economic and Political Significance; F. S. C. Northrop, Philosophy's Statement of the Problems of Creativity; A. H. Compton, Case Histories: Creativity in Science; J. W. Hanes, Big Government and Creative Thinking; L. L. Thurstone, A Psychologist Discusses the Mechanism of Thinking; J. Ferren, The Problem of Creative Thinking in Painting; E. Krenek, The Problem of Creative Thinking in Music; R. Wilbur, The Problem of Creative Thinking in Poetry. (*PsyA*, 1958, #260)

187. A PSYCHOLOGIST DISCUSSES THE MECHANISM OF THINKING

Thurstone, L. L.
In "The Nature of Creative Thinking: A Monograph," pp. 35–45, 1957
New York University Press, N. Y., 1957

Several hypotheses regarding creative talent are reviewed and suggestions are given concerning ways in which exploratory and experimental studies might be carried out. A discussion follows the author's address. (*PsyA*, 1958, #262)

188. DOUBT AND CERTAINTY IN SCIENCE: A BIOLOGIST'S REFLECTIONS ON THE BRAIN

Young, J. Z.
Oxford University Press, Inc., New York, N. Y., 1957

189. CYBERNETIC ASPECTS OF HOMEOSTASIS

Goldman, S.
January 8, 1958
Syracuse University Research Institute, New York
Technical Report 1, Report EE 494-581 T1, Nonr-66910
ASTIA AD-201,442

A discussion is presented of the *ab initio* development of the principles of feedback, servo theory, and information theory in an effort to elucidate the study of homeostasis. An elementary mathematical treatment is presented of the reduction of errors by the use of feedback. The following cases are considered: (1) a signal derived from error is fed back and added to the input signal; (2) the feedback signal is used to change the operating characteristics of the control transducer; (3) concentration is regulated by feedback operation of a storage system; and (4) the buffer solution is used as a feedback mechanism. In addition, consideration was given to such special topics as speed and accuracy, derivative and integral control, the use of the past in anticipation of the future, and the problem of instability which might result from the use of antagonists. Information theory is discussed with respect to: (1) alphabets, messages and the exponential law of choice; (2) probability; (3) quantity of information; (4) information and choice; (5) information in continuous curves; (6) errors and redundancy; and (7) translation and transmission. Application of the ideas and thinking of both control theory and information theory are presented with respect to biology, especially homeostasis.

190. THE EVOLUTION OF INTELLIGENCE. THE NERVOUS SYSTEM AS A MODEL OF ITS ENVIRONMENT

Bremermann, H. J.
July 1958
University of Washington, Seattle
Technical Report 1, Nonr-47717
ASTIA AD-201,143

Among the subjects discussed are: an information theoretical model of evolution, including abstraction of genes and chromosomes to binary heredity numbers, reproduction, selection as a code, mutation as a noise, and simulation of evolution on a computer; the central nervous system, including the local structure of the brain, a summary of facts about global structure, functions, and genetical history of the nervous system, deterministic and indeterministic machines, the problem of reality, the eigen-model of man, application of the evolution principle to the human eigen-model, and learning; simulation of the brain by machines, including analogue computers with binary elements, predicate calculus and jargon machines, a learning machine, and other machines using the evolution principle; and finally, other applications of the evolution principle, including the evolution of artifacts, the scientific method, and machine translation of languages.

191. SOME METHODS OF ARTIFICIAL INTELLIGENCE AND HEURISTIC PROGRAMMING

Minsky, M. L.
Paper presented at the Symposium on the Mechanization of Thought Processes, National Physical Laboratory, Teddington, England, November 24–27, 1958

192. PROBABILISTIC MACHINES
George, F. H.
***Automation Progress*, v. 3, no. 1, pp. 19–21, January 1958**

This article discusses recent developments in field of probabilistic computers, inductive and deductive systems, possible applications, reading problems, and teaching and learning machines. (*EI*, 1958, p. 227)

193. SYMPOSIUM: THINKING MACHINES OF THE FUTURE
AIEE Winter Meeting, February 6, 1958, New York, N. Y.
***Computers and Automation*, v. 7, no. 1, p. 29, January; v. 7, no. 1B, p. 8, January 31, 1958**

194. COMMUNICATION SCIENCES IN UNIVERSITY ENVIRONMENT
Wiesner, J. B.
***IBM Journal of Research and Development*, v. 2, no. 4, pp. 268–275, October 1958**

This article presents a review on the application of special techniques of electrical communications and of computational systems to information theory and processing in psychology, neurophysiology, linguistics, genetics, mathematics and other fields; activities of groups at Communications Sciences Center, Massachusetts Institute of Technology. (*EI*, 1958)

195. EXPERIMENTAL DESIGN: A CLOAK FOR INTELLECTUAL STERILITY
Taylor, J. G.
***British Journal of Psychology*, v. 49, pp. 106–116, 1958**

Aristotelian modes of thought are still very prevalent in psychology and are supported by an elaborate structure of statistical and experimental design techniques. By reason of their logical tidiness such techniques have the unfortunate effect of reducing the manifest discontent that this situation should engender. Psychology requires not statistical laws but scientific laws, "statements expressed in general terms, that can generate specific predictions when specific values are assigned to the general terms." Such laws are not likely to be found by statistical investigators, which are concerned with single systems rather than with populations of systems. The kinds of investigations which are required are exemplified by Piaget's studies of the development of the mind in individual children and by Kohler's work with distorting spectacles. (*PsyA*, 1959, #7223)

196. INTERPERSONAL PREFERENCE AND COGNITIVE ORGANIZATION
Kogan, N. and Tagiuri, R.
***Journal of Abnormal and Social Psychology*, v. 56, pp. 113–116, 1958**

The paper describes "an empirical test of certain aspects of Heider's theory of cognitive organization." The method, procedures, and results are described and illustrated by tables. (*PsyA*, 1959, #5518)

197. LOGICAL PROBLEMS IN THE DESCRIPTION OF THE BEHAVIOR OF AUTOMATA
McNaughton, R.
Paper presented at 23rd Annual Meeting of the Association for Symbolic Logic
(Abstract in *Journal of Symbolic Logic*, v. 23, no. 4, p. 457, 1958)

198. PAWLOW UND KRETSCHMER (PAVLOV AND KRETSCHMER)
Reifenberg, E.
***Psychiatrie, Neurologie und medizinische Psychologie*, Leipzig, v. 10, pp. 110–117, 1958**

Pavlov's criticism of Kretschmer's psychiatric starting-point in the development of a constitutional typology is being maintained by some workers in Pavlov's School, despite the fundamental changes which have taken place in Kretschmer's theories since the first edition of "Körperbau und Character." The biologically and constitutionally based investigative methods of Kretschmer's School may

contribute a clinical method with which to determine the functional types of the nervous system. Russian summary. 32 references. (*PsyA*, 1959, #7216)

199. BIBLIOGRAPHY ON COGNITIVE PROCESSES: XVIII. REASONING. XIX. LANGUAGE-MEANING

Mayzner, M. S.

***Psychological Newsletter*, New York University, v. 9, pp. 129–139, 1958**

200. PERSPECTIVES IN PSYCHOLOGY: VI. A NOTE ON THE COMPUTING MACHINE ANALOGY IN PSYCHOLOGY

Swartz, P.

***Psychological Record*, v. 8, pp. 53–56, 1958**

The uncritical use of analogy in psychology and sciences in general is discussed. Comments by R. R. Oppenheimer, J. W. Krutch, and J. R. Kantor relative to this problem are examined. (*PsyA*, 1959, #7180)

201. A NEUROPSYCHOLOGICAL APPROACH TO THINKING

Gaito, J.

***Psychological Reports*, v. 4, pp. 323–332, 1958**

A neuropsychological approach to thinking is presented. Level of potential thinking is related to the dominant frequency of the spontaneous electrical activity of the brain. A gradient of integration, indicating that highest level thinking should occur during the presence of alpha (or near alpha) frequencies, is suggested. Thinking deteriorates as frequencies deviate from this band. Relevant supporting literature is cited. (*PsyA*, 1959, #5694)

202. THE PROBLEM OF REDUCTIONISM IN PSYCHOLOGY

Jessor, R.

***Psychological Review*, v. 65, pp. 170–178, 1958**

A brief review of the classic problem of reductionism in science, especially as it pertains to psychology is given. Under logical analysis, reduction of psychology to physiology is impossible due to the inability of translating or deriving the concepts and laws of psychology from those of physiology. The hierarchy of sciences and the achievement of a unification of science are commented on. 27 references. (*PsyA*, 1959, #7169)

203. O SEPTSIALNO CHELOVECHESKIKH TIPAKH VYSSHEI NERVNOI DEIATELNOSTI (ON SPECIFICALLY HUMAN TYPES OF HIGHER NERVOUS ACTIVITY)

Gubko, A. T.

***Voprosy Psikhologii*, v. 4, pp. 25–34, 1958**

The author discusses a number of controversial issues related to the problem of "specifically human types of higher nervous activity." It appears that no agreement has as yet been reached on the particular features of the personality to be included in the concept of "specific type." Attempts to reduce them to characteristic features of the thinking process alone are debatable. The attempt to correlate specific types with characteristic features displayed in analytic-synthetic nervous activity, with emotional level, with set of abilities, vocational choice, character and general type of higher nervous activity, etc., is also held to be questionable. (*PsyA*, 1959, #5511)

204. O DVUKH STORONAKH EDINOI OTRAZHATELNOI DEIATELNOSTI CHELOVEKA (ON THE TWO SIDES OF THE UNITARY REFLECTORY ACTIVITY OF MAN)

Lapshin, O. V.

***Voprosy Psikhologii*, v. 4, no. 1, pp. 37–49, 1958**

Man's activity is social in nature and is determined by the methods of production employed in the society in which he lives. Yet his organism provides its natural basis. The brain in particular functions to reflect the external world and its relations, so that this reflection becomes in man an "ideal subjective image of reality," which results always from the "stimulation of the brain by external influences." The image in man, his thinking, and consciousness, as determined by social activity, is a "subjective reality and can only be studied indirectly by investigating the specifically human forms of objective activity: labor, behavior, and speech." Although the physiological basis of the brain's reflectory activity can be studied by reference to the physiology of higher nervous activity, this activity should not be identified with higher nervous activity as such. (*PsyA*, 1959, #9757)

205. O DVUKH VARIANTAKH "ELEMENTOV MYSLI" I. M. SECHENOVA (ON THE TWO VARIANTS OF I. M. SECHENOV'S "THE ELEMENTS OF THOUGHT")
Iaroshevskii, M. G.
***Voprosy Psikhologii*, v. 4, no. 4, pp. 3–16, 1958**

A comparison of the two editions of "The Elements of Thought" (1878 and 1903) shows the difficult road which Sechenov had to travel in order to come to a "consistently materialistic understanding of the basic problems related to the theory and psychology of the process of thinking." In supporting the thesis that a "mental phenomenon represents a real act of man's life and activity which can be understood only indirectly," Sechenov includes in the category of realities directly inaccessible to sense organs "all acts of consciousness of whatever nature they might be." (*PsyA*, 1959, #9902)

206. NEKOTORYE ZAMECHANIIA PO POVODU TOCHKI ZRENIIA P. K. ANOKHINA NA AFFERENTNYI APPARAT USLOVNOGO REFLEKSA (SOME REMARKS WITH REFERENCE TO THE POINT OF VIEW OF P. K. ANOKHIN CONCERNING THE AFFERENTIAL APPARATUS OF THE CONDITIONED REFLEX)
Alekseev, M. A.
***Zhurnal Vysshei Nervnoi Deiatelnosti*, v. 8, pp. 453–465, 1958**

Anokhin's "theory of afferential feedback" and "theory of acceptor of action" are subjected to criticism. They are held to be too much under the influence of a prematurely extrapolated cybernetic approach to brain action. The path, pointed out by Pavlov, still remains the only one which promises to lead to future research really contributing to solution of the many problems of higher nervous activity. (*PsyA*, 1959, #5202)

207. THINKING: AN EXPERIMENTAL AND SOCIAL STUDY
Bartlett, F.
Basic Books, New York, N. Y., 1958

The author's views on thinking are derived largely from his own experimental work extending over a period of many years. In the first chapter thinking is treated as a skill derived from "earlier established forms of bodily skilled behavior." Three chapters deal with the results of objective experiments in such areas as interpolation, extrapolation, and disguised evidence. One chapter is devoted to theoretical material and five chapters to the topic of adventurous thinking. In the latter chapters everyday thinking, experimental thinking, and the thinking of the artist and the experimental scientist are discussed. (*PsyA*, 1959, #3244)

208. ELECTROPHYSIOLOGIC BASIS OF NORMAL AND PSYCHOTIC FUNCTION
Burns, B. D.
In "Psychotropic Drugs," Garattini, S. and Ghetti, V., Editors, pp. 177–184, 1958
D. Van Nostrand Co., Inc., Princeton, N. J.

It is pointed out that presently there is "no physiological basis whatever for an understanding of the more complex aspects of normal mammalian behavior—and therefore there can be no satisfactory explanation of the psychoses in cellular, physical or chemical terms." The author summarizes views thus far reported along with a critique of each. His view, at the level of hypothesis, is that the nervous system as a whole must be regarded as a "homeostatic machine, continually seeking conditions of minimal neuronal activity." An original electrophysiological-experimental study is reported in support of the hypothesis. 30 references. (*PsyA*, 1959, #2636)

209. PSYCHO-PHYSIOLOGIE DU COMPORTEMENT (PSYCHOPHYSIOLOGY OF BEHAVIOR)
Hebb, D. O.
Presses Universitaires de France, Paris, 1958

210. THE INTEGRATION OF HUMAN KNOWLEDGE
Reiser, O.
Porter Sargent, Publisher, Boston, Mass., 1958

Primarily a formal analysis of the scientific enterprise (Chapters I–X), but always with an eye on the more cosmic and social implications (Chapters XI–XIII). The chapters of special interest to psychologists: Chapter III, Symbolism, Semantics and Social Synthesis; Chapter V, Logical Foundations of Science; Chapter VI, Mathe-

matical Foundations of Science; Chapter VII, Dimensions in Nature and in Thought; Chapter VIII, Scientific Method in Physics and in Psychology. Philosophically treated issues of special interest to psychologists: perception and reality, gestalt, cybernetics, communication theory, symbolic logic, isomorphism, mind-body problem. The last three chapters are the most speculative, including space given to the possible implications of ESP. The author wants a planetary democracy based on a world philosophy of scientific humanism—an effort at synthesizing such diverse matters as fact and value, emergent evolution, multi-valued logic, relativity, metalinguistics, field theory, and causality in a time of analysis and fragmentation. (*PsyA*, 1959, #5019)

211. THE COMPUTER AND THE BRAIN
von Neumann, J.
Yale University Press, New Haven, Conn., 1958

212. DYNAMICS OF BEHAVIOR
Woodworth, R. S.
Henry Holt & Co., Inc., New York, N. Y., 1958

A review and recapitulation of the literature in the areas of motivation, perception, learning and problem solving and their "dynamic" interaction. The general theoretic formulation presented by the author is an extension of his earlier "Dynamic Psychology" emphasizing organismic, intervening variables between stimulus and response, preparatory set, and the molar characteristics by which animals deal with their environments. 25-page bibliography. (*PsyA*, 1958, #2248)

213. EXPERIMENTS ON VIGILANCE: THE EMPIRICAL MODEL FOR HUMAN VIGILANCE (FIFTH IN A SERIES)
Jerison, H. J.
January 1959
Antioch College, Yellow Springs, Ohio
WADC TR 58-526, AF 33(616)6095
ASTIA AD-202,883

Paper prepared for presentation at the annual meeting of the American Psychological Association in Washington, D. C. on September 3, 1958.

A model for human vigilance is presented which is an integrated summary of empirical studies. Vigilance is defined as a probability of detecting rare and near-threshold events (signals). In the model this probability is described as a function of the combined effects of signal frequency, response frequency, signal detectability under ideal observing conditions, time at work, complexity of the monitored display, and various subject variables. A deductive theory of vigilance should have this function as one of its consequences.

214. SOME RECENT SIMPLIFICATIONS OF THE THEORY OF FINITE AUTOMATA
Jeffrey, R. C.
May 27, 1959
Massachusetts Institute of Technology, Research Lab. of Electronics, Cambridge
TR-219, DA 36-039-sc-78108, Project: 3-99-00-100

Automata are defined as four-termed relations. Reduced automata are defined as three-termed relations. A method is given for replacing the nodes and arrows in the graphs of such relations by neurons or by other logical elements in such a way that the resulting net realizes the corresponding automaton. This method is applicable whether or not the relation corresponds to a single-valued function.

215. LOGICAL, RECURSIVE AND OPERATOR METHODS FOR THE ANALYSIS AND SYNTHESIS OF AUTOMATA
Akushsky, I. Y., Basilevsky, Yu. Y., and Shreider, Yu. A.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 138–144

216. VERBAL HABIT-FAMILIES, CONCEPTS AND THE OPERANT CONDITIONING OF WORD CLASSES
Staats, A. W.
August 1959
Arizona State University, Tempe
TR 10, Psychological Processes in Language Communication, Nonr-279402
ASTIA AD-225,005

Verbal habit-family response hierarchies are described. The concept of the verbal-habit family and the theory

of communication as the higher-order conditioning of meaning, were applied to concepts and concept formation. The operant conditioning of word classes was discussed. The assumption that there are two strengthening operations for stimulus and response associations was discussed.

217. GENERAL SWITCHING THEORY

October 15, 1959
University of Pennsylvania, Moore School of Electrical Engineering, Philadelphia
QPR-5, R-60-04, AF 33(616)-5886

An introduction is given to the concept of Linear-Bounded Automata, a class intermediate between Finite Automata and Turing Machines. Languages of symbolic logic for automata are discussed further. A macro-flow chart is reported in some detail. The application of basic learning models to the problem of input categorization or input signal adaptation by a machine is discussed.

218. UN NUOVO COMPONENTE ELEMENTARE PER RETI LOGICHE DOTATE DI ALTE FACOLTA

Perotto, P. G.
1959
Torino Polytechnic Institute, Aeronautic and Applied Mechanics Lab., Italy
Monograph 424

Definition is given of the properties of an elementary cell for a logical network covering the construction of cybernetic models, establishment of an analogy with the nervous network, and application to the case of computers. (*A/SE*, December 1959)

219. BINARY MULTIPLICATION IN DIGITAL COMPUTERS

Green, A.
***Proceedings of the IRE*, v. 47, no. 6, pp. 1159–1160, June 1959 (Correspondence)**

Comparison between the computer and the human mind is discussed briefly.

220. THE ONTOGENY OF CERTAIN LOGICAL OPERATIONS: PIAGET'S FORMULATION EXAMINED BY NONVERBAL METHODS

Braine, M. D. S.
***Psychological Monographs: General and Applied*, v. 73, no. 5, pp. 1–43, 1959**

Piaget's theory and research of intelligence are considered. Criticisms leveled against this research are discussed, and studies are reported which were designed to avoid such criticism. Piaget's theory includes the concept of intellectual processes being isomorphic with the operations of bivalent logic, and his central postulate that "when the definitions of logical operations are interdependent, the intellectual processes isomorphic to these operations develop in association." Piaget's views of the development of length measurement and of concepts of order are singled out for study. The development of reasoning ability with age is considered. Finally, the experiments of the author bear out the basic postulate of Piaget.

221. MECHANIZATION OF THOUGHT PROCESSES

Davies, D. W.
***Nature*, v. 163, pp. 225–226, 1959**

222. MECHANISATION OF THOUGHT PROCESS

Proceedings of a symposium held at the National Physical Laboratory, Teddington, England, November 24–27, 1958
Symposium No. 10, Vol. 1, Her Majesty's Stationery Office, London, 1959

223. QUARTERLY PROGRESS REPORT

Wiesner, J. B., Harvey, G. G., and Zimmermann, H. J.
January 15, 1960
Massachusetts Institute of Technology, Research Lab. of Electronics, Cambridge
QPR-56, DA 36-039-sc-78108

Progress is reported in physical electronics, plasma dynamics, solid state and low temperature physics, thermoelectricity, spectroscopy, information theory, artificial intelligence, acoustics, speech communication, communications biophysics, circuit theory, noise, network synthesis and linguistics.

224. FINITE AUTOMATA. PART 1

Aizerman, M. A., Gusev, L. A., Rozonoer, L. I., Smirnova, I. M., and Tal, A. A.

***Avtomatika i Telemakhanika*, v. 21, no. 2, pp. 224–236, February 1960**

The paper presents the opinions of the authors concerning the basic content and problems in the theory of finite automata and concerning the interrelationship between this theory and the theory of contact-relay networks. Possible methods for the realization of finite automata are also studied.

Excerpts from the paper are presented in *Automation Express*, v. 2, no. 8, pp. 16–17, May 1960.

INTELLIGENCE TESTING

225. MATHEMATICAL TECHNIQUES AS RELATED TO PSYCHOLOGICAL PROBLEMS
Gulliksen, H.
September 1951–June 1956
Princeton University, N. J.
Final Summary Report, N6onr-27020
ASTIA AD-109,365

Research was conducted in the areas of test theory, factor analysis, psychological scaling, and learning. A list is included of the technical reports prepared, papers presented to professional groups, and Ph. D. dissertations aided. Studies presently in progress are: (1) the factoring of double-centered matrices, (2) dimensions of response consistency in paired comparisons, (3) interrelationships of learning measures and aptitude tests, (4) the discriminal dispersion as a function of complexity of judgment, (5) multidimensional scales for a single individual, (6) the internal consistency method of successive intervals, (7) the connotative meaning of adverb-adjective combinations, (8) a multidimensional study of personality differences, (9) a multidimensional study of friendship interrelationships, (10) a multidimensional vector model for paired comparisons, (11) a comparative investigation of different theoretical approaches to learning, (12) effects of partial reward, and (13) relation of psychophysical similarity to learning difficulty.

226. THE SEARCH FOR BASIC REASONING ABILITIES—A REVIEW OF FACTOR ANALYTIC STUDIES
Marron, J. E.
August 1953
Personnel Research Lab., Lackland AFB, Texas
HRRC Research Bulletin 53-23
ASTIA AD-19,470

Factor-analysis studies as concerned with human reasoning and as performed by Thurstone, Guilford, Adkins, and others were reviewed. Considerable agreement was observed among the various researchers concerning the factors that must be postulated in order to account for the intercorrelations among test scores. Integration of their findings showed well-defined factors: sequential induction, abstract analytic induction, sequential deduction, and complex deduction. Each factor is discussed.

227. THINKING ABILITIES
Guilford, J. P.
***Office of Naval Research, Research Reviews*, pp. 6–10, November 1953**

Work on analysis of thinking ability, especially by use of factor analysis, and methods of testing the abilities are summarized. The research program is organized around an *a priori* division into reasoning, creative thinking, evaluative, and planning abilities. (*PsyA*, 1954, #4009)

228. L'INTELLIGENCE (INTELLIGENCE)
Oléron, P.
***Année psychologique*, v. 53, pp. 83–97, 1953**

The theories of many investigators are presented, including the relation of intelligence to blood type, size of family, animal learning, problem solving, the formation of concepts, set or attitude, perseveration, rigidity, and orientation. Disagreement in experimental results should be thoroughly analyzed, from the point of view of the nature of relations existing between conceptual and perceptual thought. 28 references. (*PsyA*, 1954, #8557)

229. IMPLICATIONS OF RECENT STUDIES ON INTELLIGENCE
Bernreuter, R. G.
***Transactions of the New York Academy of Sciences*, v. 15, pp. 301–305, 1953**

Four contemporary theories of the nature of intelligence, including: (1) the hierarchy viewpoint, (2) the emergent factors viewpoint, (3) the second-order factors viewpoint, and (4) the orthogonal simple-structure viewpoint, are evaluated according to recent experimental

findings. "Anyone who wishes to make practical contributions to intelligence test construction today must first decide what his position is to be regarding the various conflicting theoretical viewpoints." For his own work in test construction the author has adopted the orthogonal simple-structure approach. (*PsyA*, 1954, #4024)

230. THE DIFFERENTIATION OF INTELLECTUAL ABILITY

Burt, C.
***British Journal of Educational Psychology*, v. 24, pp. 76–90, 1954**

The developmental conception of intelligence as an evolving, unitary faculty which becomes progressively differentiated appears to be sustained by biological, neurological, and statistical evidence. The intensive study of mental development in selected individuals and the statistical analysis of data from the testing of groups of children at different age levels provide systematic confirmation of the view that with increasing age the general factor accounts for a smaller proportion of individual variation, while group factors become increasingly predominant. Contradictory results derive from defects in the experimental plan, including failure to employ tests that will elicit special abilities. 37 references. (*PsyA*, 1955, #2206)

231. THE CONCEPT OF INTELLIGENCE AND THE PHILOSOPHY OF SCIENCE

Spiker, C. C. and McCandless, B. R.
***Psychological Review*, v. 61, pp. 255–266, 1954**

A number of the basic principles of neo-behaviorism, derived largely from the work of the logical positivists and scientific empiricists, are applied to the conceptual and research problems faced by the investigator of intelligence. Problems so treated are: the organization of intelligence, the heredity–environment issue, and the validity of intelligence tests. (*PsyA*, 1955, #3660)

232. FORMAL AND CONCRETE THOUGHT PROCESSES

Keats, J. A.
August 1955
Princeton University, N. J.
Technical Report, N6onr-27020
ASTIA AD-76,372

An empirical investigation was initiated into predictions derived from a theory by Piaget ("Psychology of Intelligence," Harcourt, Brace, and Co., N. Y., 1950) concerning the development of intelligence. Piaget's theory is interpreted as representing: (1) the development of intelligence as a process of building up a set of elements, and (2) an operation with respect to this set, such that the conditions for a semigroup are established. In this way the stage of concrete operations is established. Later in development the condition of an inverse is added, and this with the unit changes the semigroup into a group; this is the stage of formal operations. The theory was examined with respect to three content areas: arithmetic, probability theory, and inequalities (or comparisons). Data were obtained by administering 74 items to children from the fourth, sixth, seventh, eighth, and tenth grades. The results indicated that six of the seven arithmetic item pairs were related in a way suggested by theory. With the probability items, effects which could be attributed to lack of appreciation of the notion of independence were obtained with fourth and sixth grade children. No effects were obtained with the inequalities items. The results of this study were taken to indicate that Piaget's theory can be used to produce certain predictable phenomena in the group testing situation.

233. A FACTOR-ANALYTIC INVESTIGATION OF THE FACTOR CALLED GENERAL REASONING

Guilford, J. P., Kettner, N. W., and Christensen, P. R.
August 1955
University of Southern California, Psychological Lab., Los Angeles
Report 14 on Studies of Aptitudes of High-Level Personnel, N6onr-23810
ASTIA AD-75,203

A factor-analytic study was conducted to investigate the nature of the factor designated as general reasoning. Three of the most plausible hypotheses were formulated: (1) defining problems, (2) handling complicated procedures, and (3) trial-and-error manipulation. A battery of 23 tests covering these hypotheses and five reference factors was administered to an entering class of Coast Guard Academy cadets, and scores for 170 cadets were employed in the factor analysis. Ten factors were ex-

tracted by Thurstone's complete centroid method, and the axes were rotated orthogonally. Nine of the 10 rotated factors were identified as follows: verbal comprehension, numerical facility, visualization, logical evaluation, eduction of patterns, general reasoning, handling complicated procedures, trial-and-error manipulation, and mathematical achievement. The first five factors were reference factors, and the next three corresponded roughly to the three alternative hypotheses. By a process of elimination, the first hypothesis, defining problems, was found to fit the factor of general reasoning better than the other two hypotheses.

234. INFORMATION THEORY FOR PSYCHOMETRIC ANALYSIS

Cronbach, L. J.
September 15, 1955
University of Illinois, Bureau of Research and Service, Urbana
Final Report, N6ori-07146
ASTIA AD-75,995 (See also AD-25,723)

An investigation was initiated to explore the possibilities of a more comprehensive measurement theory to guide the design of psychological tests, choice of tests for practical problems, and interpretation of test data. I. Information theory: Study indicated that the Shannon formula ($H = \Sigma p_i \log p_i$) can be rationalized as a measure of message space, but that message space is of doubtful importance except in physical communication channels. A formula based on messages one symbol long, decoded with zero delay, proved to have special psychometric interest. II. Decision or utility theory: Statistical decision theory and the theory of games were studied to determine how they can assist in stating psychometric problems. III. Test design and application were found to involve four elements: the distribution of aptitude in the population, the transition probabilities (validity matrix) relating test score to aptitude, the interpretation matrix or strategy for assigning persons to treatments, and the evaluation or payoff matrix for evaluating each possible decision. IV. Sequential testing: The application of accepted mathematical solutions was studied. For selection where testing is divided into two groups, new formulas were derived. A digital computer program was employed to study the advantage of this strategy over the conventional method.

235. DIE INTELLIGENZ; EIN BEITRAG ZUR BEGRIFFSKLÄRUNG UND ZUR PRAKTISCHEN DIAGNOSTIK IM KINDESALTER (INTELLIGENCE: A CONTRIBUTION TO THE UNDERSTANDING OF THE CONCEPT AND TO APPLIED DIAGNOSIS IN CHILDHOOD)

Weidemann, J.
***Praxis der Kinderpsychologie und Kinderpsychiatrie*, v. 4, pp. 296–297, 1955**

Definitions of intelligence, as offered by various German and Anglo-Saxon psychologists, show common agreement in three areas: (1) Intelligence involves general mental adaptivity. (2) Intelligence is the sum total of inherited basic capacities and of various (functional) environmental influences. (3) The conception of intelligence as a "functional capacity." In using intelligence tests prime importance should not be given to the scope, direction, and quality of individual "factors" but to the synthesis of the individual capacities as they interact and express themselves through the total personality. (*PsyA*, 1957, #7420)

236. LEARNING

DeLong, A. R.
***Review of Educational Research*, v. 25, pp. 438–452, 1955**

A review of 136 studies completed during 1952–1955 on learning theory, teaching methods in relation to learning outcomes, measurement of learning outcomes, and the role of the learner in the learning process. In view of the great increase in publications in this field and the more frequent use of the results of research by educators, it would be desirable for learning-research experts to adopt "a universally acceptable definition of learning" which would be very helpful in the clarification of a number of issues. (*PsyA*, 1957, #514)

237. A FACTOR-ANALYTIC STUDY ACROSS THE DOMAINS OF REASONING, CREATIVITY, AND EVALUATION. II. ADMINISTRATION OF TESTS AND ANALYSIS OF RESULTS

Guilford, J. P., Kettner, N. W., and Christensen, P. R.
March 1956

University of Southern California, Psychological Lab., Los Angeles
Report 16 on Studies of Aptitudes of High-Level Personnel, N6onr-23810
ASTIA AD-97,441

A study was made to verify and determine the nature of 12 factors (11 of which were previously found in the areas of reasoning, creativity, and evaluation) and to derive information leading to the improvement of tests measuring the factors. Alternate hypotheses were formulated for eight of the previously determined factors and for verbalizing ability which was hypothesized as a new factor. Three test batteries, each requiring six hours, were formed from the original battery of 57 tests which were selected, adapted, or constructed for testing the alternate hypotheses and for defining the reference factors. Each battery was administered to a separate group of about 200 air crew trainees. None of the frequency distributions of the scores deviated appreciably from the normal curve. A separate intercorrelation matrix was obtained for each of the three batteries. Thurstone's complete centroid method was used to extract 12 factors from each of the three correlation matrices. The axes were rotated by the Zimmerman graphic orthogonal method (*Psychometrika*, v. 11, pp. 51–55, 1946). Five of the 20 distinct factors which were identified were reference factors. Eduction of perceptual and conceptual relations, eduction of patterns and correlates, verbal classification, sensitivity to problems, associational fluency, originality, and judgment were found in substantially the same form as before with some clarification of their nature. Symbol manipulation split into symbol substitution and manipulation. Four new factors were found: perceptual classification, eduction of structural relations, naming abstractions, and penetration.

238. ANXIETY, INTELLIGENCE, AND DISTORTION TOWARD SOCIAL FAVORABILITY

Voas, R. B.
May 1, 1956
Naval School of Aviation Medicine, Pensacola, Fla.
Report 10, Project NM 001 109 100
ASTIA AD-105,714

An investigation was made of the relationship between manifest anxiety as measured by the Taylor scale and "general intelligence." The Taylor scale was administered to 84 naval aviation cadets under instruction to choose the "best" (most socially acceptable) answer. A short form of this scale with only the 50 scored items as they appear in the MMPI was used. The same form of the Taylor scale was administered to another group of 319 cadets under "normal" instructions. These "normal" instructions were the same as those of the MMPI with the added statement that the results were "off the record" and confidential. Both groups were given the ACE on the same day in which they took the Taylor scale. The results indicated that naval cadets avoided the anxious responses when asked to give the "best" answer, thereby significantly reducing their Taylor scores. A small but significant negative correlation was noted between the ACE and "best" answer score, indicating that the more intelligent cadets were more successful in avoiding the anxious responses than their less intelligent classmates. If the testing situation provokes avoidance of anxiety responses, the importance of the slight advantage which intelligent subjects have on this scale would depend on the amount of variation in anxiety and intelligence within the groups measured. With naval cadets the correlation between the ACE and Taylor scale was not significant under the "normal" set. The effect apparently was not important under these conditions. (Published as "Intelligence and the Distortion of Responses on the Taylor Anxiety Scale." *Psychological Reports*, v. 2, pp. 87–89, 1956)

239. THE ROLE OF FACTORS IN ABILITY THEORY

Barratt, P. E. H.
***Australian Journal of Psychology*, v. 8, pp. 93–105, 1956**

The author makes the assumption that one of the major tasks of psychometrics is that of accounting for correlations. Hypothetical constructs should be introduced as "working bases for the development of a theory of the organization of mental abilities." An experiment involving factor analysis is described to show how our knowledge of the nature and organization of mental abilities may be furthered. (*PsyA*, 1958, #264)

240. A FACTOR-ANALYTIC INVESTIGATION OF THE FACTOR CALLED GENERAL REASONING

Kettner, N. W., Guilford, J. P., and Christensen, P. R.
***Educational and Psychological Measurements*, v. 16, pp. 438–453, 1956**

To investigate the nature of the factor called general reasoning, a battery of 23 tests was administered to an entering class of U. S. Coast Guard Academy cadets. Using Thurstone's complete centroid method ten factors were extracted: verbal comprehension, numerical facility, visualization, logical evaluation, education of patterns, general reasoning, handling complicated procedures, trial-and-error manipulation, and mathematical achievement. General reasoning seems to be most closely related to defining problems. (*PsyA*, 1958, #270)

241. THE STRUCTURE OF INTELLECT
Guilford, J. P.
***Psychological Bulletin*, v. 53, pp. 267–293, 1956**

Productive thinking is an aspect of intelligence which has been generally overlooked in most theoretical conceptualizations of human intelligence. A listing of approximately 40 intellectual factors culled from the research literature is presented. Of these numerous factors, the vast majority have to do with thinking and the remainder are memory factors. These factors are categorized according to a scheme suggested by the author. The "implications of the factors and their system were pointed out for factor theory and practice, for general psychological theory, and for the concept of intelligence and practices of intelligence testing." 31 references. (*PsyA*, 1958, #2655)

242. A REVISED STRUCTURE OF INTELLECT
Guilford, J. P.
April 1957
University of Southern California, Psychological Lab., Los Angeles
Report 19 on Studies of Aptitudes of High-Level Personnel, N6onr-23810
ASTIA AD-134,450 (See also AD-134,449)

A proposed system of intellectual factors or primary mental abilities is described along with the changes and more significant implications. The factors were found to remain the same with respect to the general framework. Within each major category of factors, mental abilities are classified in terms of the materials involved (figural, structural, and conceptual) and in terms of the functions or processes applied to those materials (things cognized, things produced, and types of judgment made). The factor of auditory figural recognition was added to the cognitive group. The factor of perceptual speed and a factor involving identification of letters and numbers were added to the evaluative group. The factors eduction of conceptual correlates and structural redefinition were added to the convergent-thinking list, fitting into two formerly vacant cells. Several factors were moved from one major category to another in the system. One factor, speed of evaluation, was eliminated from the system on the ground that it appears to be a nonaptitude trait. Some of these changes resulted in more consistency of row categories from one major group of factors to another. A start was made toward a general theory of thinking that would include accounts of problem solving, creative performance, and decision making.

243. PROBABILITY AND STATISTICS IN ITEM ANALYSIS AND CLASSIFICATION PROBLEMS. EFFICIENT DESIGN AND USE OF TESTS OF MENTAL ABILITY FOR VARIOUS DECISION-MAKING PROBLEMS
Birnbaum, A.
November 1957
School of Aviation Medicine, Randolph Air Force Base, Texas
Report 58-16
ASTIA AD-153,785

The application is described of the Neyman-Pearson and Wald theories of inference and statistical decision-making to problems of efficient design and use of tests of a single ability. It is shown that a number of mathematical difficulties which arise in the classical model can be circumvented by representing the item characteristic curve by a logistic function rather than the usual normal ogive.

244. IMPROVING CRITERIA FOR COMPLEX MENTAL PROCESSES
Wilson, R. C.
Proceedings of the 1957 Invitational Conference on Testing Problems
Educational Testing Service, 1957, pp. 13–20

An attempt is described to develop performance tests for certain complex mental processes. This attempt was made in conjunction with the Gifted Child Project of Portland Public Schools. Progress in this area will be made in two major directions: a clarification of the con-

ceptualizations of the complex mental processes so that tests will have greater content validity, and a specification of the elements in the criterion which may affect the predictive validity of tests. (*PsyA*, 1959, #3078)

245. ON THE UNIFIED FACTOR THEORY OF MIND

Ahmavaara, Y.
Annales Academiae Scientarum Fennicae,
Series B, v. 106, 1957
Soumalainen Tiedeakatemia Toimituksia, Helsinki

It is the purpose of this study to develop further the factor theory in terms of factorial comparison. In the formulation involved, the procedures are factorization, rotation and transformation. The latter allows comparison of different studies to determine whether factors of one are the same as those of another. The studies included fall into four domains: Reasoning-closure (18 studies), Verbal (6 studies), Mechanical (4 studies), and Musical (3 studies). Common factors according to level of certainty and mean invariance values developed from these studies are as follows: First level—Number (0.85); Word fluency (0.73); Space (0.63); Reasoning (0.63); Verbal (0.60); Visualization (0.51); Speed-strength of perceptual closure (0.47); Deduction (0.46); Perceptual speed (0.43). Second level (two comparisons)—Manual dexterity (0.85); Ideational fluency (0.58); Flexibility of perceptual closure (0.54); Memory (0.52); Speed-strength of perceptual closure (0.47); Deduction (0.46); Perceptual speed (0.43); General reasoning (0.35). Third level (one comparison)—Pitch discrimination (0.73); Psychomotor coordination (0.69); Redefinition (0.49). Some interpretation of the confirmed factors is attempted. The author is also interested in group differences in terms of factorial concepts and a treatise on sociological theory of alcoholism from this standpoint is to be published. 30 references. (*PsyA*, 1959, #1)

246. SYMPOSIUM: CONTRIBUTIONS TO INTELLIGENCE TESTING AND THE THEORY OF INTELLIGENCE: I. ON DEFINING INTELLIGENCE

Miles, T. R.
***British Journal of Educational Psychology,* v. 27, pp. 153–165, 1957**

Appraisal of a definition of intelligence requires a clear understanding of the sense in which the word "definition" is used. Six possible senses are examined; of these, the "operational" definition is regarded as fundamentally sound, and superior to the search for the "real nature" of intelligence. In the case of lexical definitions there need be no serious dispute among psychologists. Wechsler's definition, in the light of the distinctions made, is not a simple lexical conception of intelligence, but rather a key for understanding further relevant data. Burt, who is more conscious of the problem involved, offers a definition which must be assessed as partly lexical as well as stipulative. Basically, however, the crucial problem is whether or not Burt's definition proposes a policy productive of worthwhile results. (*PsyA*, 1959, #3287)

247. LES COMPOSANTES DE L'INTELLIGENCE D'APRES LES RECHERCHES FACTORIELLES (THE COMPONENTS OF INTELLIGENCE ACCORDING TO FACTOR ANALYSIS)

Oléron, P.
Presses Universitaires de France, Paris, 1957

"The aim of this work is to present the works which attempted to describe the structure of intelligence with the method of factor analysis." The first part of this book is devoted to the theory of two factors (the origin of the psychology of intelligence and the contribution of Spearman, the development of the technique and its experimental verifications, the formal structure of the theory and the interpretation of a general factor); the second part, to the multiple factor theories (the development of multiple factor studies, the general factor and multifactorial analysis, and the significance of factors), and third, to the results—the discovered factors. 13-page bibliography. (*PsyA*, 1958, #1376)

248. INTELLIGENCE. TIME FOR A CHANGE

Liverant, S.
1958
University of New Mexico, Albuquerque
Report, AFOSR TN-58-1111, AF 49(938)33
ASTIA AD-207,837

The concept of intelligence was analyzed with respect to its ability to explain behavior. Evidence from the literature of the past 20 years was used to challenge accepted conceptions of the general and innate nature of intelligence. The suggestion was made that the term intelligence be relegated to a descriptive function applicable to certain kinds of behavior whose explanation

can be attempted by the continued development of existing constructs. In addition, it was suggested that I. Q. tests be interpreted as culturally expected standards of academic achievement involving a number of complexly interrelated variables (e.g., motives, habits, expectancies, reinforcements, etc.) to account for the results.

MODELS AND THEORIES OF NERVE TRANSMISSION

249. THE INTEGRATIVE ACTION OF THE NERVOUS SYSTEM
Sherrington, C. S.
Yale University Press, New Haven, Conn., 1906

250. THE DISCHARGE OF IMPULSES IN MOTOR NERVES AND FIBERS. PART II. THE FREQUENCY OF DISCHARGE IN REFLEX AND VOLUNTARY CONTRACTION
Adrian, E. D. and Bronk, D. W.
Journal of Physiology, v. 67, pp. 119–151, 1929

251. THE MECHANISM OF NERVOUS ACTION
Adrian, E. D.
University of Pennsylvania Press, Philadelphia, 1932

252. THE ACTIVITY OF NERVE CELLS
Adrian, E. D.
Nature, v. 132, pp. 465–468, 1933

253. A LOGICAL CALCULUS OF THE IDEAS IMMANENT IN NERVOUS ACTIVITY
McCulloch, W. S. and Pitts, W.
Bulletin of Mathematical Biophysics, v. 5, pp. 115–133, 1943

254. REPRESENTATION OF EVENTS IN NERVE NETS AND FINITE AUTOMATA
Kleene, S. C.
December 15, 1951
RAND Corp., Santa Monica, Calif.
RM-704

To what kinds of events can a McCulloch-Pitts nerve net respond by firing a certain neuron? More generally, to what kinds of events can any finite automaton respond by assuming one of certain states? This memorandum is devoted to an elementary exposition of the problems and of results obtained on it during investigations in August, 1951.

255. MECHANISMS OF NEURAL MATURATION
Sperry, R.
"Handbook of Experimental Psychology"
Stevens, S. S., Editor
John Wiley & Sons, Inc., New York, N. Y., 1951

256. A DISCUSSION ON EXCITATION AND INHIBITION
Eccles, J. C.
Proceedings of the Royal Society of London, Series B, v. 140, pp. 169–202, 1952–1953

A symposium under the leadership of this author covering the following topics: (1) the nature of the monosynaptic excitatory and inhibitory processes in the spinal cord, (2) propagation of electrical signals along giant nerve fibers, (3) the electrical activity of the motor endplate, (4) diversity of transmission processes as exemplified by specific synapses in electric organs, (5) aspects of excitation and inhibition in the retina, and (6) central excitation and inhibition from the viewpoint of chemical transmission. (*PsyA*, 1954, #262)

257. EXCITATION AND CONDUCTION IN THE NERVOUS SYSTEM
Larrabee, M. G. and Edwards, C.
Annual Review of Physiology, v. 15, pp. 283–304, 1953

The survey of the literature covered approximately one year ending July, 1952. Organized under the following headings: The Role of Ions in Conduction of Impulses; Other Aspects of Excitation and Conduction in Nerve Fibers; Neuromuscular Transmission in Skeletal Muscle; Transynaptic Excitation; and Morphology of Nerve Cells. 183-item bibliography. (*PsyA*, 1954, #1993)

258. THE NEUROPHYSIOLOGICAL BASIS OF THE MIND; THE PRINCIPLES OF NEUROPHYSIOLOGY
Eccles, J. C.
Oxford University Press, Inc., New York, N. Y., 1953

This book covers the field of neurophysiology and the current methods of investigation. The material is organized under the following chapter headings: The Ionic Hypothesis and the Resting Membrane; The Ionic Hypothesis and the Active Membrane; Transmission Across Peripheral Junctional Regions; The Electrophysiology of the Neurone and Synaptic Transmission in the Central Nervous System; Central Inhibition, Co-ordination of Reflexes, and Transmission of Information; Prolonged Functional Changes (Plasticity) in the Nervous System; The Cerebral Cortex; and The Mind–Brain Problem. 20-page bibliography. (*PsyA*, 1954, #1978)

259. NERVOUS TRANSMISSION
Tasaki, I.
Charles C. Thomas, Publisher, Springfield, Ill., 1953

This monograph describes studies, primarily by Tasaki and his associates, on neural transmission with special reference to the nodes of Ranvier. The experimental evidence presented indicates "that the node of Ranvier of the nerve fiber is the physiological unit that is capable of developing the action current." Chapters are devoted to saltatory transmission, properties of the nerve fiber carrying an impulse, the myelin sheath, effect of electrotonous on transmission, the nerve trunk and techniques of preparing single nerve fibers for study. (*PsyA*, 1955, #5381)

260. SIMULATION OF SELF-ORGANIZING SYSTEMS BY DIGITAL COMPUTER
Farley, B. G. and Clark, W. A.
***IRE Transactions on Information Theory*, v. IT-4, pp. 76–84, 1954**

The systems examined here consist of randomly interconnected nets of idealized neuron-like elements. It is desired to have the nets learn to respond in specified ways to different classes of inputs. This is done through use of a pair of modifying operators which are chosen according to whether or not the behavior has just been observed to change in a favorable direction. If the change is considered favorable, the chosen modifier increases the potency of those internal connections which have recently been active. The empirical results show that this kind of operation, for which the reviewer suggests the term structural reinforcement, does indeed yield the desired kind of learning.

The important feature of such a system is that application of the modifier is based solely on the behavior, and not on detailed examination of what has happened within the net, so that in principle such a machine could solve problems in ways not anticipated by the programmer. Computations were performed on the high-speed experimental machine, MTC, of the MIT Lincoln Lab. in Lexington.

261. NOVOE V UCHENII O MEZHNEIRONNYKH OTNOSHENIIAKH V MOZGU (NEW [DEVELOPMENTS] IN THEORY ON INTERNEURONAL RELATIONSHIPS IN THE BRAIN)
Dolgo-Saburov, B. A.
***Zhurnal Vysshei Nervnoi Deiatelnosti*, v. 4, no. 6, pp. 903–908, 1954**

A discussion of new developments in the interneuronal field. (*PsyA*, 1956, #3854)

262. CONDUCTION AND TRANSMISSION IN THE NERVOUS SYSTEM
Crescitelli, F.
***Annual Review of Physiology*, v. 17, pp. 243–268, 1955**

A survey of the literature from June 1953 to June 1954 pertinent to the following major topics: properties of the resting nerve and muscle fiber, active nerve and muscle fiber, transmission at junctions and cholinergic systems. 163 references. (*PsyA*, 1956, #212)

263. A STATISTICAL THEORY OF MONOSYNAPTIC INPUT-OUTPUT RELATIONS
Rall, W.
***Journal of Cellular and Comparative Physiology*, v. 46, pp. 373–411, 1955**

A theory is proposed based on the number and distribution of synaptic knobs over the motoneurons of a motoneuron pool, and the resulting thresholds of these motoneurons. The relation between input and output depends on two parameters only: an average motoneuron threshold and a standard deviation of the motoneuron population with respect to excitation. Predictions are

made and verified on families of input-output curves and post-tetanic potentiation. A theory of monosynaptic synergy is defined. (*PsyA*, 1957, #2185)

264. PROPERTIES OF A MASS OF CELLS CAPABLE OF REGENERATING PULSES
Beurle, R. L.
***Philosophical Transactions of the Royal Society of London*, v. B 240, no. 669, p. 55, 1955**

265. I. M. SECHENOV I EGO ROL V RAZVITII FIZIOLOGII NERVNOI SISTEMY (I. M. SECHENOV AND HIS ROLE IN THE DEVELOPMENT OF THE PHYSIOLOGY OF THE NERVOUS SYSTEM)
Orbeli, L. A.
***Zhurnal Vysshei Nervnoi Deiatelnosti*, v. 5, pp. 765–772, 1955**

A discussion of Sechenov's contribution to and role in the development of neurophysiology. (*PsyA*, 1958, #2396)

266. ELECTRICAL SIMULATION OF SOME NERVOUS SYSTEM FUNCTIONAL ACTIVITIES
Taylor, W. K.
Proceedings of the Third Symposium on Information Theory, Royal Institution, London, September 12–16, 1955
In "Information Theory," Cherry, C., Editor
Academic Press, New York, N. Y., 1956, pp. 314–328

Selected empirical properties of "real" nervous system structures were simulated with an analogue computer and non-linear switching elements. The behavior of the computer nervous system shows many detailed and system properties of "real" nervous systems. An electronic model of associative learning is discussed. (*PsyA*, 1957, #4127)

267. LIMITS ON NERVE IMPULSE TRANSMISSION
Wall, P. D., Lettvin, J. Y., Pitts, W., and McCulloch, W. S.
***IRE Convention Record*, v. 4, Part 4, Computers, Information Theory, Automatic Control, pp. 128–131, 1956**

268. TESTS ON A CELL ASSEMBLY THEORY OF THE ACTION OF THE BRAIN, USING A LARGE DIGITAL COMPUTER
Rochester, N., Holland, J. Haibt, L. H., and Duda, W. L.
***IRE Transactions on Information Theory*, v. IT-2, no. 3, p. 80, 1956**

269. ANALYIS OF REFLEX VARIABILITY IN TERMS OF PARTIALLY CORRELATED EXCITABILITY FLUCTUATION IN A POPULATION OF MOTONEURONS
Rall, W. and Hunt, C. C.
***Journal of General Psychology*, v. 39, pp. 397–422, 1956**

Consideration of a motoneuron population as an array of units each subject to independent and correlated components of excitability fluctuation has indicated the manner in which the two components contribute to variation in population response. It is clear that correlated fluctuations in excitability of units comprising a population will be much more effective in causing variation in population response than will independent fluctuations, providing the number of units is reasonably large. (*PsyA*, 1957, #183)

270. SOME PROPERTIES OF A RANDOMLY CONNECTED NEURAL NETWORK
Allanson, J. T.
Proceedings of the Third Symposium on Information Theory, Royal Institution, London, September 12–16, 1955
In "Information Theory," Cherry, C., Editor
Academic Press, New York, N. Y., 1956, pp. 303–313

Even with extremely restrictive limitations placed upon (conceptual) neural elements, the behavior of randomly-connected networks of these elements is complex. The network properties are discussed in relation to experimental neurophysiological findings. (*PsyA*, 1957, #4096)

271. SIMULATING THE BEHAVIOUR OF A NERVE SYSTEM
Yemel'yanov-Yaroslavskii
October 26, 1956

Moscow University Mathematical Computing Faculty Seminar, 1956–1957
To be published in *Problems of Cybernetics*

272. CONTROL UNITS OF THE NERVOUS SYSTEM
Gurfinkel, V. S.
February 8, 1957
Moscow University Mathematical Computing Faculty Seminar, 1956–1957
To be published in *Problems of Cybernetics*

273. RECENT ADVANCES IN RUSSIAN NEUROPHYSIOLOGY
Liberson, W. T.
Annual Review of Physiology, v. 19, pp. 557–588, 1957

A review of the Russian literature from January 1950 to July 1956 on the following topics: excitability, nerves and muscles, receptors, spinal cord, cerebral potentials and conditioning. 140 references. (*PsyA*, 1958, #2389)

274. NEKOTORYE STRUKTURNYE I KHIMICHESKIE IAVLENIIA V RAZDRAZHAEMOM NEIRONE (SOME STRUCTURAL AND CHEMICAL PHENOMENA IN THE STIMULATED NEURON)
Liudkovskaia, R. G.
Biofizika, v. 2, pp. 589–601, 1957

Data are adduced to show that the physical and chemical properties as well as the submicroscopic structure of the substance of the nerve cell and axon are altered during their excitation, thereby confirming: (1) the alteration of protein metabolism in the excited nerve cell; and (2) the relationship between the ultrastructural and metabolic processes during excitation. (*PsyA*, 1958, #4882)

275. RESPONSE PATTERNS OF CORTICAL NEURONS
Mountcastle, V., Davies, P., and Berman, A.
Journal of Neurophysiology, v. 20, p. 374, 1957

276. DIE ERREGUNGSVERTEILUNG IM ZENTRALNERVENSYSTEM: INSBESONDERE BEI BEDINGTEN REFLEXEN (THE DISTRIBUTION OF EXCITATION IN THE CENTRAL NERVOUS SYSTEM: ESPECIALLY IN CONDITIONED REFLEXES)
Gottschick, J.
Psychiatre, Neurologie und medizinische Psychologie, Leipzig, v. 9, pp. 230–238, 1957

The distribution of excitatory centers in the brain is hypothesized on the basis of known neuro-biologic facts and on the assumption that discharge readiness of neurones depends on excitatory and inhibitory presynaptic terminals. This theoretic neurone model could explain important peculiarities of conditioned reflexes. Russian summary. (*PsyA*, 1959, #235)

277. KIBERNETIKA I NEKOTORYE VOPROSY SOVREMENNOI SISTEMY (CYBERNETICS AND CERTAIN PROBLEMS OF CONTEMPORARY PHYSIOLOGY OF THE NERVOUS SYSTEM)
Gurevich, B. KH.
Vestnik Akademii Nauk SSSR, v. 24, pp. 31–40, 1957

A short treatment of several problems in neurophysiology is provided from the cybernetic point of view, and several analogies are discussed. Pavlovian physiology will advance as a result of the congenial application of cybernetic concepts to it. (*PsyA*, 1958, #2382)

278. THE PHYSIOLOGY OF NERVE CELLS
Eccles, J. C.
Johns Hopkins Press, Baltimore, Md., 1957

A considerable amplification of the 29th Course of Lectures on the Herter Foundation at Johns Hopkins University on the motor neurone and excitatory synaptic action, inhibitory synaptic action, and pathways and transmitter substances in the central nervous system. (*PsyA*, 1957, #4105)

279. METABOLISM OF THE NERVOUS SYSTEM
Richter, D., Editor
Pergamon Press, New York, N. Y., 1957

This book is the proceedings of the 2nd International Neurochemical Symposium. Fifty-five research and review papers on various aspects of neurochemistry are presented. Among the topics are molecular structure, cytochemical characteristics of neurons, blood-brain barrier, electrolytes and nervous conduction, in vivo and in vitro brain metabolism coenzyme influences on metabolism and chemical transmission factors. There are extensive bibliographies and brief discussions of each paper. (*PsyA*, 1959, #2689)

280. CENTRAL AND SYNAPTIC TRANSMISSION IN THE NERVOUS SYSTEM: PHARMACOLOGICAL ASPECTS
Paton, W. D. M.
***Annual Review of Physiology*, v. 20, pp. 431–470, 1958**

The material is organized and reviewed in terms of the following topics: criteria for chemical transmission across synapses, distribution of components of possible transmitter mechanisms, release of transmitters, mechanisms involved in the genesis of bioelectric potentials, pharmacological evidence for chemical transmission—cholinergic, adrenergic transmission, tryptaminergic transmission, substance P, inhibitor substance of Florey (I), general physiology, effects of certain drugs, blood-brain barriers, autonomic ganglia, and collateral sprouting. 335 references. (*PsyA*, 1959, #5240)

281. O VOZMOZHNYKH PUTIAKH OBNARUZHENIIA ELEKTRONNOI PROVODIMOSTI V ELEMENTAKH NERVNOI SISTEMY (ON POSSIBLE WAYS OF DISPLAYING ELECTRONIC CONDUCTIVITY IN ELEMENTS OF THE NERVOUS SYSTEM)
Liberman, E. A.
***Biofizika*, v. 3, pp. 743–745, 1958**

A neuronal model, based on semiconductors, is presented and discussed. In real neurones semiconductor elements may be fashioned out of protein molecules which under certain conditions possess the property of electronic conductivity. (*PsyA*, 1959, #9472)

282. MACHINES AND THE BRAIN
George, F. H.
***Science*, v. 127, pp. 1269–1274, 1958**

A logical net is the simple geometrical realization of mathematical logic that has a form that is similar to, and perhaps can be made identical with, the structure of the nervous system. Major topic headings are: Logical Nets, Machines, Development of Nets, The Nervous System, and Weighting of Events. It is necessary to relate mechanisms of the central nervous system (based when possible on the simplest notions of excitation and inhibition) to appropriate mathematical functions. The link between the sort of systems that are actually used by humans and the machine analogies described are of increasing importance. (*PsyA*, 1959, #7164)

283. NOVYE DANNYE O PEREKLIUCHENII V USLOVNOREFLEKTORNOI DEIATEL'NOSTI (NEW DATA ON SWITCHING IN CONDITIONED REFLEX ACTIVITY)
Asratian, E. A.
***Zhurnal Vysshei Nervnoi Deiatelnosti*, v. 8, pp. 305–312, 1958**

Recent research is presented on switching in conditioned-reflex activity—a phenomenon referring to the "possibility of developing simultaneously two conditioned reflexes of different kinds to one and the same indifferent signal. (*PsyA*, 1959, #5540)

284. INITIATION OF NERVE IMPULSES IN RECEPTOR AND CENTRAL NEURONS
Bullock, T. H.
***Reviews of Modern Physics*, v. 31, no. 2, pp. 504–514, April 1959**

The objective of this paper is twofold: to point out some of the problems which represent the present state of physiological analysis of some sense organs as detectors and transducers, and to point out a current view of the complex chain of events between transducing a stimulus and initiating a nerve impulse. It will be argued that this chain is similar in receptor and central neurons and that information about either one is relevant to the other.

285. MECHANISMS OF SYNAPTIC TRANSMISSION
Katz, B.
***Reviews of Modern Physics*, v. 31, no. 2, pp. 524–531, April 1959**

The propagation of an impulse along a nerve or muscle fiber is brought about by two coupled processes: (1) cable transmission, which allows an electric potential change to spread along a short distance, but with rapid attenuation, and (2) a boosting mechanism by which the full signal strength is regenerated at each point. If either of these processes is interfered with, the signal will be blocked and will fade out locally. The cable mechanism depends upon the continuity of the fiber structure, with a relatively low-resistance core and high-impedance surface layer. During the impulse, sufficient current must be able to flow forward along the inside of the axon and outward through the resting membrane to stimulate it. If one were to close the core with a high-resistant transverse membrane, or to place a low-resistance shunt across the fiber surface, transmission would be impaired and probably would fail at that point. The very reason why thousands of axons packed together within one nerve bundle can conduct their messages independently, without mutual interference, rests on the absence of structural continuity, and so of an effective cable connection between them.

The purpose of this paper is to consider what happens at "synapses," the points of contact between one nerve cell and the next, or between nerve and muscle fiber. There is no sign of cytoplasmic continuity between the different cell units. Electron-microscope evidence shows that the membranes of the synapsing cells are arranged in close proximity, though in general they do not seem to fuse or to come into intimate contact. The electron micrographs, however, do not reveal anything about the electrical properties of the contacting surfaces; and one has no means of guessing intuitively whether or not an effective cable linkage exists across the synapse.

286. NEURAL LIMITATIONS OF VISUAL EXCITABILITY. I. THE TIME COURSE OF MONOCULAR LIGHT ADAPTATION
Battersby, W. S. and Wagman, I. H.
***Journal of the Optical Society of America*, v. 49, no. 8, pp. 752–759, August 1959**

The tests performed are described and changes in threshold are pointed out. When a rough estimate of the photochemical contribution to these threshold changes was subtracted from the raw data, residual threshold increments were obtained and attributed to neural processes. On the basis of time course, it is suggested that these neural processes involve central as well as peripheral factors.

287. SOME FUNCTIONS OF NERVE CELLS IN TERMS OF AN EQUIVALENT NETWORK
Freygang, W. H., Jr.
***Proceedings of the IRE*, v. 47, no. 11, pp. 1862–1869, November 1959**

A distributed parameter equivalent network of a nerve cell is developed. The network is based upon the electrical constants of nervous tissue. Inserted in the network are electrically and chemically activated generators. Some experimental evidence is given for the properties of the network and the generators, as well as for the location of the generators in the network. The function of the neurons in the nervous system is discussed in terms of this network.

288. ACTIVATION: A NEUROPSYCHOLOGICAL DIMENSION
Malmo, R. B.
***Psychological Review*, v. 66, no. 6, pp. 367–386, November 1959**

289. STABILITY AND OSCILLATIONS IN A NEUROLOGICAL SERVOMECHANISM
Stark, L. and Baker, F.
***Journal of Neurophysiology*, v. 22, pp. 156–164, 1959**

290. REPETITIVE DISCHARGE OF NEURONS
Wall, P. D.
***Journal of Neurophysiology*, v. 22, p. 305, 1959**

291. NEURON DOCTRINE AND ELECTROPHYSIOLOGY
Bullock, T. H.
***Science*, v. 129, no. 3353, 1959**

292. OSCILLATIONS OF A NEUROLOGICAL SERVOMECHANISM PREDICTED BY THE NYQUIST STABILITY CRITERION
Stark, L.
"Selected Papers in Biophysics"
Yale University Press, New Haven, Conn., 1959

293. NEURISTOR STUDIES

Crane, H. D.
July 11, 1960
Stanford University, Electronics Labs., Stanford, Calif.
TR 1506-2, Nonr 225(24), NR 373 360

Neuristor is the name assigned to a novel class of hypothesized devices, whose conception was stimulated by consideration of the following question: Is it possible to build an electronic computer in an environment in which good conductors, or "wires," are not available for carrying signals? That an arbitrary computer system can be devised in such an environment is indicated in this thesis. Active channels for signal transmission are considered. Alone, they provide full logic facility for system realization, and interconnection of such channels realize arbitrarily complex computer systems. No other components are required. Active channels suitable for use in this role are called neuristors.

A neuristor is defined as a device having the form of a one-dimensional channel along which signals may flow, the signals taking the form of propagating discharges having the following properties: (1) threshold stimulability, (2) uniform velocity of propagation, (3) attenuationless propagation, and (4) refractory period following the passage of a discharge, after which the neuristor can again support a discharge.

Both the common chemical fuse and the axon process (nerve fiber) of a neuron are devices of this class. The former satisfies all except the last of the listed properties, but is not "self-healing" after each discharge. However, the axon process of the neuron exhibits all four properties. A neuron, which operates on ionic principles, is an example of neuristor realization in a liquid environment. It is demonstrated that such properties can be realized in homogeneously distributed electronic structures as well. An investigation of the logical power of and the development of techniques of logic using neuristors are reported. To develop neuristor networks it is necessary to specify the allowed modes of interconnection of such devices. It is indicated that there are basically two types of junctions—namely, a T junction and an S junction. All network synthesis is then a "game" on these two (junction) symbols. The game and logical possibilities are studied in considerable detail. It is demonstrated that not only may all of the conventional logic network properties be realized with neuristors, but also some properties not having simple direct analogs. Two properties worth noting, in particular, are: (1) the ability to realize any nonplanar logic network on a two-dimensional physical structure, and (2) the ability to obtain controllable probabilistic gating structures with exactly the same basic neuristor device.

294. THE DIGITAL SIMULATION OF NEUROMUSCULAR ORGANISMS

Reiss, R. F.
***Behavioral Science*, v. 5, no. 4, pp. 343–358, October 1960**

Various neural-like network models are compared and criticized.

295. ACTIVITY IN NETWORKS OF NEURON-LIKE ELEMENTS

Farley, B. G. and Clark, W. A.
Massachusetts Institute of Technology, Lincoln Lab., Lexington
Report

For model construction in neurophysiology, it is necessary to have a knowledge of the dynamic behavior of structures embodying characteristics suggested by the anatomy and physiology of nervous tissue, as well as information as to how the behavior depends on the particular hypothesis under consideration. This paper reports on the status of a continuing study of these questions using the Lincoln TX-2 computer to carry out the necessary calculations. The neuron model used incorporates both analog and all-or-none characteristics and their interaction includes both spatial and temporal summation. Calculations have been made with various values of cell parameters and with different topological connections. The topology primarily used has been a sheet of about 1000 cells with connections specified by two-dimensional probability distributions. Both self-sustained activity dependent primarily on the network, and decremental activity dependent on both network and input have been observed.

ELECTRICAL STUDY OF THE BRAIN AND ITS FUNCTIONS

296. THE CARDIAC, RESPIRATORY AND ELECTRICAL PHENOMENA INVOLVED IN THE EMOTION OF FEAR
Blatz, W. E.
Journal of Experimental Psychology, v. 8, pp. 109–132, 1925

297. ELECTROPHYSIOLOGY OF MENTAL ACTIVITIES
Jacobson, E.
American Journal of Psychology, v. 44, pp. 677–694, 1932

298. ELECTRICAL ACTIVITY OF THE BRAIN IN CHILDREN AND ADULTS
Lindsley, D. B.
Psychological Bulletin, v. 34, pp. 768–769, 1937

299. TRANSMISSION OF IMPULSES THROUGH CRANIAL MOTOR NUCLEI
de Nó, R. L.
Journal of Neurophysiology, v. 2, pp. 402–464, 1939

300. THE ELECTRICAL RESPONSES OF THE HUMAN EYE
Adrian, E. D.
Journal of Physiology, v. 104, pp. 89–104, 1945

301. THE ELECTROENCEPHALOGRAM AND PSYCHOPHYSIOLOGICAL REGULATION IN THE BRAIN
Daniel, R. S.
American Journal of Psychiatry, v. 102, pp. 791–798, 1946

302. A NEW ELECTROENCEPHALOGRAM ASSOCIATED WITH THINKING
Kennedy, J. L., Gottsdanker, R. M., Armington, J. C., and Gray, F. E.
Science, v. 108, pp. 527–529, 1948

303. THE RELATION BETWEEN THE KAPPA ELECTROENCEPHALOGRAM AND RECALL
Kennedy, J. L. and Gottsdanker, R. M.
American Psychologist, v. 4, p. 224, 1949

304. BIOELECTRIC POTENTIALS IN THE NERVOUS SYSTEM AND MUSCLE
Lloyd, D. P. and McIntyre, A. K.
Annual Review of Physiology, v. 11, pp. 173–198, 1949

305. SOME BIOELECTRIC CHARACTERISTICS OF THE KAPPA RHYTHM
Kennedy, J. L., Gottsdanker, R. M., Armington, J. C., and Gray, F. E.
Electroencephalography and Clinical Neurophysiology, v. 1, p. 25, 1949

306. THE KAPPA RHYTHM AND PROBLEM SOLVING BEHAVIOR
Kennedy, J. L., Gottsdanker, R. M., Armington, J. C., and Gray, F. E.
Electroencephalography and Clinical Neurophysiology, v. 1, p. 516, 1949

307. THE RELATION BETWEEN ELECTRO-ENCEPHALOGRAPHIC LATENCY TIME OF BLOCKING OF THE ALPHA RHYTHM AND THE REACTION TIME TO LIGHT
Stamm, J. S.
American Psychologist, v. 5, p. 254, 1950

308. AN EXAMINATION OF THE ELECTRICAL FIELD THEORY OF CEREBRAL INTEGRATION
Lashley, K. S., Chow, K. L., and Semmes, J.
Psychological Review, v. 58, pp. 123–136, 1951

309. ELECTRICAL RESPONSES OF THE BRAIN IN RELATION TO BEHAVIOR
Munday-Castle, A. C.
Proceedings of the South African Psychological Association, no. 3, pp. 18–19, 1952

310. EVOKED SINGLE CORTICAL ACTIVITY
Amassian, V.
Electroencephalography and Clinical Neurophysiology, v. 5, p. 415, 1953

311. LEARNING MOTIVATED BY ELECTRICAL STIMULATION OF THE BRAIN
Delgado, J. M. R., Roberts, W. W., and Miller, N. E.
American Journal of Physiology, v. 179, pp. 587–593, 1954

Permanent multilead needle electrodes were implanted within the brains of cats to determine whether the emotional disturbance induced by electrical stimulation of specific structures could be used to motivate learning. It was found that a "fear-like" reaction could be elicited from three regions: (1) superior part of the tectal region in the neighborhood of the spinothalamic tract, (2) the lateral nuclear mass of the thalamus, and (3) the inferomedial part of the hippocampal gyrus. Stimulation of other regions of the brain did not elicit the fear-like reaction. It is concluded "that the fear-like reaction elicited by stimulation in these regions has all the drive properties of a true emotion." (*PsyA*, 1955, #6837)

312. ELECTRICAL RESPONSES OF THE HUMAN VISUAL SYSTEM
Burian, H. M.
A.M.A. Archives of Opthalmology, v. 51, pp. 509–524, 1954

313. MAXIMUM RATES OF FORM PERCEPTION AND THE ALPHA RHYTHM: AN INVESTIGATION AND TEST OF CURRENT NERVE NET THEORY
Murphree, O. D.
Journal of Experimental Psychology, v. 48, pp. 57–61, 1954

Several deductions were made and tested relating to the time factor involved in the hypothesis of a scanning neurological process. "The results show: (1) there is a significant relation between the alpha rhythm and the temporal aspect of rapid successive spatial perceptions . . . (2) Strong support is indicated for the view that maximum rates of form perception, apparent motion, figure-ground reversals (at appropriate rates), and fusion of separate spatial elements into simultaneously perceived composite forms or shapes are mediated by a nerve net of which the alpha rhythm is an integral part." (*PsyA*, 1955, #1999)

314. ELECTROMAGNETIC AND ELECTROSTATIC FIELDS: A NEGLECTED AREA IN PHYSIOLOGICAL PSYCHOLOGY
Bingham, W. E., Jr.
Journal of Psychology, v. 37, pp. 225–231, 1954

The author reviews 16 references on electromagnetic and electrostatic fields in relation to the nervous system, and points out several undeveloped areas of potential significance for psychology. Further knowledge of the impulse, medical aids, sensory functions, and possible cerebral mechanisms is needed. (*PsyA*, 1954, #8370)

315. AN ANALOG CORRELATOR SYSTEM FOR BRAIN POTENTIALS
Barlow, J. S. and Brown, R. M.
July 14, 1955
Massachusetts Institute of Technology, Research Lab of Electronics, Cambridge
Technological Report 300

316. ELECTROPHYSIOLOGY OF THE CEREBRAL CORTEX
Bishop, G. A.
1955
Office of Naval Research Washington, D. C.
Report of Institutional Projects, National Science Foundation

317. CORRELATES BETWEEN PSYCHOLOGICAL PROCESSES AND THE ELECTRICITY ACTIVITY OF THE BRAIN
Jasper, H. H.
Acta Psychologia, v. 11, pp. 162–163, 1955

318. RHINENCEPHALIC ACTIVITY DURING THOUGHT

Lesse, H., Heath, R. R., Mickle, W. A., Monroe, R. R., and Miller, W. H.
***Journal of Nervous and Mental Disease*, v. 122, pp. 433–440, 1955**

Four patients with chronically implanted cortical and subcortical electrodes furnished an opportunity for exploring the electrical activity of the amygdaloid and rostral hippocampal regions of the brain. Results showed distinct and reproducible changes in electrical recordings that were correlated with spontaneous and interview-elicited thinking. Theoretical interpretations are suggested. (*PsyA*, 1957, #171)

319. ELEKTROFIZIOLOGICHESKAIA KHARAKTERISTIKA FUNKTSIONALNYKH SVIAZEI MEZHDU NEĬRONAMI SIMMETRICHNYKH UCHASTKOV KORY POLUSHARIĬ BOLSHOGO MOZGA (ELECTROPHYSIOLOGICAL CHARACTERISTICS OF THE FUNCTIONAL CONNECTIONS BETWEEN THE NEURONES OF THE SYMMETRICAL PORTIONS OF THE CEREBRAL CORTEX)

Rabinovich, M. Ia.
***Zhurnal Vysshei Nervnoi Deiatelnosti*, v. 5, no. 3, pp. 438–448, 1955**

Experimental data lead to the conclusion that the "chief forms of constant signalization, by which the neurones of the symmetrical cortical points are connected with each other, are connections [which are characterized by] spreading local excitation and connections [which are characterized by] electrotonic action at a distance. (*PsyA*, 1957, #2183)

320. ELECTROGRAPHIC STUDIES OF THE FORMATION OF TEMPORARY CONNECTIONS IN THE BRAIN

Morrell, F. and Jasper, H. H.
***Electroencephalography and Clinical Neurophysiology*, v. 8, pp. 201–215, 1956**

Conditioning of the alpha-blocking *R* and the cortical *R* to intermittent photic stimulation to visual, auditory, and tactual CSs is demonstrated in monkeys. "The localized occipital frequency-specific, repetitive discharge which, following paired trials, is elicited by a previously ineffective stimulus and is subject to differentiation, we regard as an objective trace in cortical activity of a conditioned temporary connection." (*PsyA*, 1957, #177)

321. O DVIZHENII NERVNYKH PROTSESSOV PRI ZAMYKANII VREMENNOI SVIAZI (ON LABILITY OF THE NERVOUS PROCESS WHILE [ESTABLISHING] CLOSURE OF THE CONDITIONED CONNECTION)

Naumova, T. S.
***Fiziologicheskii Zhurnal SSSR*, v. 42, pp. 695–703, 1956**

With experimentally developed closure of a conditioned-reflex circuit to sound in the cortical terminus of the motor analyzer, there appear changes in the EEG different from those produced by the same stimulus before polarization. Therefore closure is determined by the processes of summation of excitation, arising in the dominant locus which develops in the process of establishing closure. (*PsyA*, 1959, #2680)

322. ASPECTS NEUROPHYSIOLOGIQUES DE QUELQUES MECANISMES DU COMPORTEMENT (NEUROPHYSIOLOGICAL ASPECTS OF SOME BEHAVIOR MECHANISMS)

Jouvet, M.
***Journal de psychologie normale et pathologique*, v. 53, pp. 141–162, 1956**

Results of experiments with cats with chronic cortical and subcortical electrode implants lead the author to the following conclusions: During "attention" Pavlov's orientation reaction to the stimulus is accompanied by a desynchronization of the EEG, and, simultaneously, central inhibitory mechanisms at various cortical or subcortical levels block the transmission of signals of other extraneous stimuli. During "habituation," i.e., when a repetitive stimulus no longer evokes a behavior response, inhibition at the level of the first sensory relay is observed, an inhibition which disappears if the repetitive stimulus acquires a new "significance" through conditioning. During "conditioning" an augmentation of cortical responses to the condition stimulus is seen together with a new response to the same stimulus at the cortical projection of the unconditioned stimulus. Other aspects of conditioning also are discussed. 40 references. (*PsyA*, 1958, #1140)

323. CORTICAL EVOKED POTENTIALS
Li, C-L., Cullen, C., and Jasper, H.
***Journal of Neurophysiology*, v. 19, p. 111, 1956**

324. BRAIN WAVES AND PROBLEMS OF PSYCHOLOGY
Ellingson, R. J.
***Psychological Bulletin*, v. 53, pp. 1–34, 1956**

Since World War II numerous advances have been reported dealing with the relationships between brain waves and psychological processes. These studies are summarized and discussed under the categories of sleep and wakefulness, sensation, response processes, perception, and complex processes. "Each new discovery seems to reveal the brain as an even more versatile organ than was previously appreciated. The major advances in the areas discussed have unquestionably stemmed from the delineation of anatomical connections and physiological functions of the reticular formation of the lower brain stem and the diffuse thalamic projection system." 206 references. (*PsyA*, 1957, #2163)

325. REAKTSIIA ELEKTRICHESKIKH KOLEBANIĬ MOZGA NA SVETOVYE RAZDRAZHENIIA, IMEIUSHCHIE RAZLICHNOE SIGNALNOE ZNACHENIE (REACTION OF ELECTRIC WAVES OF THE BRAIN TO PHOTIC STIMULATIONS POSSESSING DIFFERING SIGNAL SIGNIFICANCE)
Mushkina, N. A.
***Zhurnal Vysshei Nervnoi Deiatelnosti*, v. 6, no. 1, pp. 164–169, 1956**

Data on the suppression of the alpha-rhythm in various contexts involving conditioning are supplied. Verbal conditioning plays a great role in the suppressive reaction. (*PsyA*, 1957, #5453)

326. FOUNDATIONS OF BIOELECTRONICS FOR HUMAN ENGINEERING
Ford, A.
April 4, 1957
Navy Electronics Lab., San Diego, Calif.
Report 761
ASTIA AD-145,734

The report includes: the viewpoint in engineering; amplitude and frequency of bioelectric signals; the organized bioelectric facility; bioelectric components: electrodes, transducers, amplifiers and recorders; the human transmission system; bioelectric scoring and control; effort, fatigue, rest, and sleep; physical work and manual skills; normal mental work; emotional stress in mental work; unfavorable special environmental conditions; injury, drug effects, and pathology; bioelectrical aspects of vision; applications to human engineering; and a summary of bioelectrical applications to human engineering.

327. COMPUTER TECHNIQUES FOR THE STUDY OF PATTERNS IN THE ELECTRO-ENCEPHALOGRAM
Farley, B. G., Clark, W. A., Jr., Frishkopf, L. S., and Gilmore, J. T.
November 6, 1957
Massachusetts Institute of Technology, Lincoln Lab, Lexington
TR-165
(Presented at the Michigan Symposium on Pattern Recognition, 1957)
ASTIA AD-110,027

A process has been explored, using the Lincoln TX-0 computer, for detecting patterns in the electroencephalogram. Preliminary results indicate that a number of different subjects and states of the same subject can be distinguished with excellent probability.

328. PICTURE OF LEARNING DRAWN BY BRAIN WAVES
***Science News Letter*, v. 72, p. 360, December 7, 1957**

329. ELECTRONIC COMPONENTS AND PSYCHOLOGICAL RESEARCH
Wrigley, C.
***American Psychologist*, v. 12, pp. 501–508, 1957**

330. THE EFFECT ON VISUAL PERCEPTION OF STIMULATING THE BRAIN WITH POLARIZING CURRENTS
Thomas, G. J. and Stewart, P. A.
***American Journal of Psychology*, v. 70, pp. 528–540, 1957**

"A physiological implication of the field-theory of cortical function was investigated by passing 8–10 ma of direct current through the head, via scalp electrodes, while various perceptual functions were tested." The tests included the visual equation of lines, the CFF, the absolute threshold for form, and the frequency of reversals of ambiguous figures. No effects on these functions by the current could be detected. It is pointed out that these results are equivocal for the field-theory of cortical function. (*PsyA*, 1959, #2796)

331. RELATION OF BRAIN AND TREMOR RHYTHMS TO VISUAL REACTION TIME

Lansing, R. W.
***Electroencephalography and Clinical Neurophysiology*, v. 9, pp. 497–504, 1957**

One to two hundred visual reaction times were measured in each of eight Ss, while recording the EEG of visual and motor cortex and the tremor of the responding finger. Significant differences were found between mean reaction times associated with different phases of the alpha cycle in both visual and motor areas. The hypothesis that an excitability cycle is associated with the alpha rhythm is supported. Where corrections were made for central-peripheral conduction times, the periods of enhanced excitability for motor and occipital alpha cycles were found to coincide. Further, finger *R*s usually occurred on the descending phase of the tremor cycle, suggesting the possibility of an excitability cycle in the spinal motor neuron pools also. (*PsyA*, 1959, #2668)

332. THE ELECTROENCEPHALOGRAM AND MENTAL ACTIVITY

Mundy-Castle, A. C.
***Electroencephalography and Clinical Neurophysiology*, v. 9, pp. 643–655, 1957**

An analysis is made of EEG changes during eye-opening, mental arithmetic, and visual and kinesthetic imagery in normal Ss. Data are also presented concerning theta activity and emotional behavior in clinical cases. Activity in the alpha, beta, and theta frequency bands are subclassified according to topography and reactivity; alpha and alphoid rhythms are distinguished, as well as two types of beta and four types of theta activity. (*PsyA*, 1959, #2678)

333. SOME OBSERVATIONS ON LAMBDA WAVES AND PERIPHERAL STIMULATION

Green, J.
***Electroencephalography and Clinical Neurophysiology*, v. 9, pp. 691–704, 1957**

Lambda waves are best seen when the S looks at detailed pictures with interest. Eye movements are a necessary but not sufficient condition for their production. They are apparently related to, but not identical with, evoked responses and K-complexes, especially the latter. The evidence suggests they may have more in common with the arousal mechanism than with eye movements alone. (*PsyA*, 1959, #2389)

334. NEKOTORYE VOPROSY IZMERENIIA I ANALIZA EEG I TEORIIA INFORMATSII (SOME PROBLEMS ON THE MEASUREMENT AND ANALYSIS OF THE EEG AND THE THEORY OF INFORMATION)

Kozhevnikov, V. A.
***Fiziologicheskii Zhurnal SSSR*, v. 43, pp. 983–984, 1957**

A number of problems related to the EEG are discussed in the light of information theory: fineness of measurement of certain parameters, reliability of judgments of certain reactions, etc. "The practical utilization of inverse probability calculations in objective audiometry and other applications requires the solution of many problems, in particular the problem of the relationships between thresholds and that of the role of the nonstationary character of reactions (extinction, development of conditioned connections, etc.)." (*PsyA*, 1958, #4874)

335. ELECTRICAL STIMULATION OF THE BRAIN AND THE PSYCHOPHYSIOLOGY OF LEARNING AND MOTIVATION

Ziegler, H. P.
***Psychological Bulletin*, v. 54, pp. 363–382, 1957**

This paper is primarily a review of research in which electrical stimulation of the central nervous system is employed in the investigation of neural mechanisms involved in the learning process. Though there has been an extensive amount of work reported in this area, there are, at present, few generalizations which can be made. Reports of experimental analysis of the effects of brain

stimulation on learning and motivation are few in number. There is also a great need for developing a more sophisticated conceptual framework within which to formulate future research. 101-item bibliography. (*PsyA*, 1959, #757)

336. DONNEES NEURO-PHYSIOLOGIQUES RECENTES CONCERNANT L'ATTENTION ET LE CONDITIONNEMENT (RECENT NEUROPHYSIOLOGICAL DATA ON ATTENTION AND CONDITIONING)

Jouvet, M.
***Psychologie Française*, v. 1, no. 2, pp. 15–17, 1957**

An attempt is made to relate certain concepts from classical conditioning with data taken from EEG and other electrical recordings of cortical activity. The concepts of attention, external inhibition and extinction are discussed. (*PsyA*, 1958, #2383)

337. THE EEG, VISUAL IMAGERY AND ATTENTION

Oswald, I.
***Quarterly Journal of Experimental Psychology*, v. 9, pp. 113–118, 1957**

This article states that a "given individual may show a different 'type' of EEG from one occasion to the next. A group of persons, known to indulge spontaneously in certain recognizable varieties of vivid imagery, contained the same proportion of the different EEG 'types' as a large control sample." The previously reported association between alpha blocking and visual imagery might arise from "the fact that difficulty in thinking: (1) activates mechanisms which desynchronize EEG potentials, (2) provokes the emergency of visual images." (*PsyA*, 1959, #2862)

338. SYNTHESIS OF "ON-OFF" AND "OFF" RESPONSES IN A VISUAL-NEURAL SYSTEM

Ratliff, F. and Mueller, C. G.
***Science*, v. 126, pp. 840–841, 1957**

"By combining . . . various influences of the discharge of impulses, 'on-off' and 'off' responses have been 'synthesized' in individual fibers of the Limulus optic nerve. . . . The consequences of these experiments are twofold. (1) they lend support to the view that 'on-off' and 'off' responses are the result of the complex interplay of excitatory and inhibitory influences by showing that the experimental manipulation of these influences can, indeed, yield such transient responses; and (2) they show the feasibility of using the Limulus preparation in the further study of these transient responses." (*PsyA*, 1959, #421)

339. CERTAIN PHYSIOLOGICAL CORRELATES OF PSYCHOMOTOR FUNCTIONING

Malmo, R. B.
January 1, 1958
McGill University, Montreal, Canada
DA 49-007-md-626
ASTIA AD-208,935 (See also AD-208,735)

Experimental progress was reported on: (1) physiological changes during tracking under conditions of sleep deprivation; (2) individual differences in patterning and level of physiological activity; and (3) electromyographic (EMG) reactions to strong auditory stimulation as a function of arousal level. In addition, progress was reported on the construction of a new tracking apparatus and a continuous amplitude/time analyser for integrating electroencephalographic (EEG) frequencies in the beta range. Evidence was presented favoring the conclusion that tracking under conditions of sleep deprivation is chiefly associated with progressively increasing physiological activation during the vigil. During qualitatively-different stimulus situations (and also under varying degrees of activation in the same situation) individuals exhibited characteristic patterns of somatic and autonomic response. Results from auditory stimulation experiments showed that arousal level (as determined by a combined EEG and EMG index) was positively correlated with magnitude, and negatively correlated with habituation rate of EMG after-responses.

340. AN INVESTIGATION OF THE PHASE OF THE ALPHA RHYTHM IN RELATION TO VISUAL RECOGNITION

Boswell, R. S.
1958
University of Utah, Salt Lake City
Thesis

341. PHYSIOLOGY OF VISION
Brindley, G. S.
***Annual Review of Physiology*, v. 20, pp. 559–582, 1958**

This review covers the period from June 1954 to May 1957, and the material is organized in terms of the anatomy and histochemistry of the retina and visual pathway, photolabile pigments of the retina and their derivatives, human sensory experiments, electrical activity of the retina, electrical activity of the higher parts of the visual pathway, and higher parts of the visual pathway studied by methods other than electrical. 269 references. (*PsyA*, 1959, #5328)

342. DEĬSTVIE POLIA ULTRAVYSOKOI CHASTOTY NA FUNKTSII NERVNOĬ SISTEMY (ACTION OF ULTRA HIGH FREQUENCY FIELD ON THE FUNCTIONS OF THE NERVOUS SYSTEM)
Livshits, N. N.
***Biofizika*, v. 3, pp. 426–437, 1958**

The author presents a survey of research on the action of ultra high frequency fields on the functions of the nervous system and examines the implications of this research. 91 references. (*PsyA*, 1959, #5229)

343. OB ELEKTROFIZIOLOGICHESKIKH POKAZATELIAKH VOZBUZHDENIIA I TORMOZHENIIA V KORE GOLOVNOGO MOZGA (ON ELECTROPHYSIOLOGICAL INDICES OF EXCITATION AND INHIBITION IN THE CEREBRAL CORTEX)
Kogan, A. B.
***Fiziologicheskii Zhurnal SSSR*, v. 44, pp. 810–819, 1958**

Electrical potentials and thresholds for direct stimulation of the cerebral cortex at sites in the analyzers were studied in animals with implanted electrodes under conditions of unrestrained behavior involving various forms of cortical activity. Alpha-rhythm depression, evoked by exposure to conditioned and unconditioned stimulation, is accompanied by lowering of excitability at the sites from which potentials are led off. Contrary to these indications of external inhibition, internal inhibition is initiated at a certain "stage of hypersynchronized activity of slow waves, as an expression of excitation under pessimal conditions." Persistence of desynchronization and hypersynchronization reactions, points to "cortical irradiation," that is, the "transcortical spread of basic nervous processes." Excitatory or inhibitory effects of conditioned stimuli can be revealed in the form of primary responses evoked. One can show by means of recordings from microelectrodes that "variations of primary responses with conditioning are related to alteration of paths of excitation within the cell layers of the cerebral cortex." (*PsyA*, 1959, #2664)

344. ROL' PROTSESSA NSVOENIIA RITMA PRI FORMIROVANII DVIGATELNOGO STEREOTIPA U CHELOVEKA PO DANNYM ELEKTROENTSEFALOGRAFICHESKIKH ISSLEDOVANII (THE ROLE OF THE PROCESS OF LEARNING RHYTHM IN THE FORMATION OF A MOTOR STEREOTYPE IN MAN ACCORDING TO THE DATA OF ELECTROENCEPHALOGRAPHIC STUDIES)
Shtiurmer, E. B.
***Fiziologicheskii Zhurnal SSSR*, v. 44, pp. 859–865, 1958**

Details are given of data drawn from simultaneous registration of the mechanogram and EEG of individuals in the course of mastering various digital rhythms. (*PsyA*, 1959, #2694)

345. THE DEVELOPMENT OF CONCEPTS RELATING TO THE ELECTRICAL ACTIVITY OF THE BRAIN
Brazier, M. A. B.
***Journal of Nervous and Mental Disease*, v. 126, pp. 303–321, 1958**

After a historical account of the evolution of concepts concerning the electrical activity of the brain, a speculative synthesis is attempted which purports to explain a wide variety of action that departs from the homeostatic condition of the brain. Emphasis is on function rather than on structure. 108 references. (*PsyA*, 1959, #7406)

346. A DIFFERENTIATION OF SPONTANEOUS UNIT FIRING IN SUBCORTICAL STRUCTURES OF THE CAT'S BRAIN
Schlag, J.
***Science*, v. 127, pp. 1184–1185, 1958**

On the assumption that "differences in spontaneous firing may assist in the recognition of functionally differ-

ing neurons or neuronal organizations, or both, records of neuronal activity were systematically derived with microelectrodes from various diencephalic and mesencephalic regions of the cat's brain." A table of results is presented which indicates different patterns of spontaneous unit firing under Nembutal anesthesia from various brain recording sites. A graphic representation also indicates spontaneous unit activity in subcortical structures of the cat. (*PsyA*, 1959, #7429)

347. VSESOIUZNAIA KONFERENTSIIA PO VOPROSAM ELEKTROFIZIOLOGII TSENTRALNOĬ NERVNOĬ SISTEMY (ALL-UNION CONFERENCE ON PROBLEMS OF ELECTROPHYSIOLOGY OF THE CENTRAL NERVOUS SYSTEM)

Rabinovich, M. Ia.
***Zhurnal Vysshei Nervoni Deiatelnosti*, v. 8, pp. 148–153, 1958**

Summaries are provided of papers on electrophysiology of the central nervous system, read at a special conference held in Leningrad in May, 1957. A great number of the papers are devoted to the electrophysiological analysis of conditioned-reflex activity. (*PsyA*, 1959, #5244)

348. LONG-TERM RECORDING FROM SINGLE NEURONS IN BRAIN OF UNRESTRAINED MAMMALS

Strumwasser, F.
***Science*, v. 127, pp. 469–470, 1958**

It has been found possible to record discharges of single neurons for periods of a week or more by implantation of several stainless-steel wires 80 μ in diameter, with insulation exposed at the cross section of the tip. The animal in use is the California ground squirrel, Citellus beecheyi, which is being used in a study of brain mechanisms in hibernation. The technique is described. Two figures are presented to indicate results. One of these illustrates the pattern "of a unit in the mesencephalic reticular formation of an alert, deafened squirrel resting in the dark." The second figure illustrates certain persistent spike waves which are inferred to be the "action potentials of single and identical neurons." It is believed that techniques which allow the study of the behavior of neurons over a period of days are of potential value in understanding long-term phenomena in the central nervous system, including learning, memory and recall; these techniques are now available. (*PsyA*, 1959, #5256)

349. INVESTIGATION OF THE POSSIBLE INFLUENCE OF ATMOSPHERIC IONS ON HUMAN REACTION TIME

Eichmeier, J.
January 30, 1959
Technische Hochschule, Munich, Germany
DA 91-508-EUC-268, Final Technical Report
January 1–December 31, 1958
ASTIA AD-210,761

This report discusses: reaction time measurement by the push-button method; encephalographic reaction time measurement; influence of artificial ions on the human brain at lower pressures; small ion counter equipment.

350. TAPPING THE ELECTRIC POWER OF THE NERVOUS SYSTEM FOR BIOLOGICAL TELEMETERING

Pinneo, L. R. and Kesselman, M. L.
May 1959
U. S. Air Force, Research and Development Command, Andrews AFB, Washington, D. C.
TN 59-15
ASTIA AD-209,067

351. PROCESSING NEUROELECTRIC DATA

Siebert, W. M.
July 7, 1959
Massachusetts Institute of Technology, Research Lab of Electronics, Cambridge
TR-351, DA 36-039-sc-78108

This report attempts to bring together in one place the views that this group has developed over the past half dozen years on processing the electrical data that is recorded from the nervous system. The following chapters are included: (1) The Quantification of Neuroelectric Activity; (2) Evoked Responses; and (3) Two Techniques for the Processing of EEG Data. There are also: Appendix A—The Description of Random Processes; B—Mathematical Statistics; C—Description of Computers; and D—Selection of Publications by Members.

352. SUBCORTICAL PHOTICALLY AND SOMESTHETICALLY EVOKED ELECTRIC ACTIVITY IN THE HUMAN BRAIN DURING ATTENTION

Jouvet, M.
1959

Lyons University, France
Report, AFOSR TN-59-697, AF 61(514)1206
ASTIA AD-219,392

353. INSTRUMENTATION OF NERVOUS SYSTEM FOR STUDIES OF BEHAVIOR
Adey, W. R.
November 16, 1959
American Rocket Society, New York, N. Y.
ARS Paper 933-59

354. SOME PROPERTIES OF THE FINITE TIME SAMPLE AUTOCORRELATION OF THE ELECTROENCEPHALOGRAM
Weiss, T. F.
1959
Massachusetts Institute of Technology, Dept. of Electric Engineering, Cambridge
Thesis

355. HOW ELECTRONICS CONTROLS DEPTH OF ANESTHESIA
Bellville, J. W. and Attura, G. M.
Electronics, v. 32, no. 5, p. 43, January 30, 1959

Automatic controls may be used to check continuously the "border-of-wakefulness" of a patient undergoing a surgical operation. A servo-driven automatic system replaces the human anesthesiologist in the administration of anesthetic agents; it regulates the amount of anesthetic being administered. (*C&A*, March 1959)

356. SOME QUANTIFIABLE ASPECTS OF THE ELECTRICAL ACTIVITY OF THE NERVOUS SYSTEM (WITH EMPHASIS UPON RESPONSE TO SENSORY STIMULI)
Rosenblith, W. A.
Reviews of Modern Physics, v. 31, no. 2, pp. 532–545, April 1959

A study of the electrical responses, in the human nervous system, evoked by sensory stimuli. In addition to measuring the electric potentials of single electrodes an attempt is made to observe the pattern of response when a "population" of neural units are mutually interacting. In this way it is hoped to study the "state" of the organism as it reacts selectively to sensory stimulation. The interpretation of electro-encephalogram patterns is an essential part of the techniques employed. (*PA*, 1959, #10446)

357. AUTOCORRELATION AND CROSS-CORRELATION ANALYSIS IN ELECTROENCEPHALOGRAPHY
Barlow, J. S.
IRE Transactions on Medical Electronics, v. 6, pp. 179–193, 1959

358. "STEADY-STATE" AUDITORY NERVE POTENTIALS FOR DIFFERENT STIMULUS REPETITION RATES
Peake, W. T., Goldstein, M. H., Jr., and Kiang, N. Y. S.
Journal of the Acoustical Society of America, v. 31, p. 123, 1959

359. EFFICIENCY IN PROBLEM SOLVING
Blatt, S. J. and Stein, M.
Journal of Psychology, v. 48, pp. 193–213, 1959

The authors define certain variables of performance in the PSI apparatus, formerly described by E. R. John, J. G. Miller, and J. W. Gyr.

360. THE APPLICATION OF AUTOCORRELATION ANALYSIS TO ELECTROENCEPHALOGRAPHY
Barlow, J. S., Brazier, M. A. B., and Rosenblith, W. A.
Proceedings of the First National Biophysics Conference, Quastler, H. and Morowitz, H. J., Editors
Yale University Press, New Haven, Conn., 1959, pp. 622–626

361. QUANTITATIVE METHODS IN THE ANALYSIS OF NEUROELECTRIC ACTIVITY
Sandel, T. T., Molnar, C. E., Weiss, T. F., Barlow, J. S., Brown, R. M., Goldstein, M. T., Jr., and Rosenblith, W. A.
Proceedings of the 2nd International Conference on Medical Electronics
Paper 10.4
Illiffe and Sons, Ltd., Dorset House, London
(in press)

362. A STATISTICAL MODEL FOR INTERPRETING NEUROELECTRIC RESPONSES
Goldstein, M. H., Jr.
Information and Control, v. 3, no. 1, pp. 1–17, March 1960

363. THE ELECTRICAL ACTIVITY OF THE NERVOUS SYSTEM: A TEXTBOOK FOR STUDENTS
Brazier, M. A. B.
Pitman Medical Publishers, England, 1960

PHYSIOLOGY AND ANATOMY OF THE BRAIN

364. HISTOLOGIE DU SYSTEME NERVEUX
Cajal, P. R.
Ramon y Cajal, Maloine, Paris, France, 1909–1911

365. BRAIN MECHANISMS AND INTELLIGENCE
Lashley, K. S.
University of Chicago Press, Ill., 1929

366. LEARNING: I. NERVOUS MECHANISMS OF LEARNING
Lashley, K. S.
In "The Foundations of Experimental Psychology," Clark University Press, Worcester, Mass., 1929

367. BASIC NEURAL MECHANISMS IN BEHAVIOR
Lashley, K. S.
Psychological Review, v. 37, pp. 1–24, 1930

368. MASS ACTION IN CEREBRAL FUNCTION
Lashley, K. S.
Science, v. 73, pp. 245–254, 1931

369. INTEGRATIVE FUNCTIONS OF THE CEREBRAL CORTEX
Lashley, K. S.
Physiological Review, v. 13, pp. 1–43, 1933

370. THE PROBLEM OF CEREBRAL ORGANIZATION IN BEHAVIOR
Lashley, K. S.
Biological Symposia, Vol VII, p. 302, Cattell, London, 1942

371. THE ANATOMY OF THE NERVOUS SYSTEM
Ranson, S. W. and Clark, S. L.
W. B. Saunders Co., Philadelphia, Pa., 1947

372. PHYSIOLOGICAL PSYCHOLOGY
Freeman, G. L.
D. Van Nostrand Co., Inc., New York, N. Y., 1948

373. CEREBELLO–BULBO–RETICULAR PATHWAY FOR SUPPRESSION
Snider, R. S., McCulloch, W. S., and Magoun, H. W.
Journal of Neurophysiology, v. 12, pp. 323–334, 1949

374. PAWLOW JAKO BADACZ I TWORCA FIZJOLOGII I PATOLOGII WYZSZYCH CZYNNOSCI NERWOWYCH (PAVLOV AS A RESEARCH WORKER AND CREATOR OF THE PHYSIOLOGY AND PATHOLOGY OF HIGHER NERVOUS FUNCTIONS)
Konorski, J.
Acta Physiologica Polonica, v. 1, pp. 32–48, 1950

The author analyzes factors which brought Pavlov to the creation of the physiology of higher nervous functions, traces the main phases of its development, reviews the most important applications in the work of his disciples and points to its significance for the related fields of knowledge, such as psychiatry, psychoneurology, psychology, pedagogics and clinical medicine. (*PsyA*, 1955, #6552)

375. AN ASCENDING RETICULAR ACTIVATING SYSTEM IN THE BRAIN STEM
Magoun, H. W.
A.M.A. Archives of Neurology and Psychiatry, v. 67, pp. 145–154, 1952

376. PSYCHOLOGICAL IMPLICATIONS OF THE "ACTIVATING SYSTEM"
Linn, L.
American Journal of Psychiatry, v. 110, pp. 61–65, 1953

Recent advances in neurophysiology relating to the so-called "activating system" have been summarized. Tentative correlations have been suggested concerning the properties of this system and certain psychological phenomena associated, primarily, with the mechanisms of defense. (*PsyA*, 1954, #1995)

377. INTRACORTICAL INTEGRATION

Burns, B. D.
***Electroencephalography and Clinical Neurophysiology*, Supplement 4, pp. 72–81, 1953**

378. PHYSIOLOGICAL INTERRELATIONSHIPS BETWEEN CORTEX AND SUBCORTICAL STRUCTURES

Magoun, H. W.
***Electroencephalography and Clinical Neurophysiology*, Supplement 4, pp. 163–167, 1953**

379. COMPARATIVE PHYSIOLOGY OF NERVOUS SYSTEMS AND SENSE ORGANS

Prosser, C. L.
***Annual Review of Physiology*, v. 16, pp. 103–124, 1954**

Studies on the comparative aspects of the physiology of nervous systems and sense organs from 1950 to June 1953 are reviewed. The material is organized in terms of the following topics: nerve nets, giant fibers and their synapses, small-fiber integration systems, chemical mediators in nervous systems, photoreceptors, chemoreceptors, thermoreceptors, mechanoreceptors, equilibrium sense, and direction sense in birds. 257 references. (*PsyA*, 1955, #206)

380. TOWARDS A NEUROLOGY OF BEHAVIOR

Mackay, R. P.
***Neurology*, v. 4, pp. 894–901, 1954**

This presidential address to the American Neurological Association calls attention to the lack of an adequate neurological theory of behavior, and emphasizes that the dominant part the cerebral cortex has played in past theory must be modified in light of recent discoveries of the functional properties of other neural regions. While progress has been made in understanding the neurology of regulatory behavior, still lacking is adequate theory of the neurology of concept formation and the neurology of character. Tentative suggestions are advanced. (*PsyA*, 1955, #5047)

381. SOME OBSERVATIONS ON THE FUNCTIONAL ORGANIZATION OF THE HUMAN BRAIN

Penfield, W.
***Proceedings of the American Philosophical Society*, v. 98, pp. 293–297, 1954 (See also *Main Currents in Modern Thought*, v. 11, no. 2, pp. 27–30, 1954)**

Consciousness in man is dependent upon the good functioning of the upper part of the brain stem, the centrencephalon. Direct electrical stimulation of the known sensory and motor cortical areas produces isolated colors, sounds, feelings or movements, never totally integrated experiences. On the other hand, direct stimulation of integrative areas in the anterior frontal lobes or the temporal lobes of the cortex may revive (in epileptics at least) experiences as vivid as reality, memories of long past conversations or of the hearing of instrumental music, as if a film record of the past were being reproduced. The author speculates with dualistic assumptions on the neural mechanisms involved. (*PsyA*, 1955, #5053)

382. A C.I.O.M.S. SYMPOSIUM: BRAIN MECHANISMS AND CONSCIOUSNESS

Adrian, E. D., Bremer, F., and Jasper, H. H., Editors
Blackwell Scientific Publications, Oxford, 1954

383. SYMPOSIUM ON PHYSIOLOGICAL PSYCHOLOGY, SCHOOL OF AVIATION MEDICINE, U. S. NAVAL AIR STATION, PENSACOLA, FLORIDA, MARCH 10, 11, 1955, UNDER THE SPONSORSHIP OF PHYSIOLOGICAL PSYCHOLOGY BRANCH, PSYCHOLOGICAL SCIENCES DIVISION, OFFICE OF NAVAL RESEARCH

Office of Naval Research, Washington, D. C.
ONR Symposium Report ACR-1
ASTIA AD-60,100

In this symposium the following topics were discussed: the physiological basis of taste; the correlation of physiological and behavioral studies of taste sensitivity; discussion on taste; the nature of stimuli for

cutaneous sense; the utilization of cutaneous reception for communications; sensitivity changes during adaptation to illumination; the chemistry of retinal pigments; electrical activity of the human eye; the organization of neural activity in the eye; stimulus determinants of speed in classifying visual patterns; the perception of motion in space; visual and stereoscopic acuity for moving objects; some quantitative aspects of an opponent colors theory; discussion on vision; introductory remarks; the nature of auditory stimuli and their attenuation; vibration patterns similar to those observed in the basilar membrane; sound conduction in the ear; cortical transmission of auditory stimuli; the ear in communications; neural mechanisms of hearing; auditory flutter fusion in patients with cortical ablations; the auditory cortex; cortical networks; somatic responses; and some relations to stimuli.

384. STUDY OF THE NATURE OF THE SENSORY DISCHARGE IN THE KINESTHETIC SENSE
Nafe, J. P.
1955
Army Dept., Office of the Surgeon General, Washington, D. C.
Institutional Projects Report, National Science Foundation

385. NEUROANATOMIC AND NEUROPHYSIOLOGIC SUBSTRATA OF BEHAVIOR-FUNCTION OF THE OLIVO–COCHLEAR PATHWAY
1955
Army Dept., Walter Reed Army Medical Center, Washington, D. C.
Report of Government Projects, National Science Foundation

386. BRAIN CONTROL OF THE SENSE ORGANS
Granit, R.
***Acta Psychologica*, v. 11, pp. 117–118, 1955**

387. VISCERAL FUNCTIONS OF THE NERVOUS SYSTEM
Burn, J. H.
***Annual Review of Physiology*, v. 17, pp. 293–310, 1955**

Literature pertinent to the following topics was reviewed: hypothalamus and pituitary, hypothalamic and posterior lobe extracts, paraventricular nucleus and oxytocin, release of pituitary hormones, pituitary and renal circulation, pseudocholinesterase, cholinesterase in glial tumors, sympathin in the brain, peripheral ganglia in blood vessels, carotid body and sinus, acetylcholine and sodium transport, transmission of sensory impulses, salivary glands, 5-hydroxytryptamine, epinephrine, gastric secretion and histamine. 88 references. (*PsyA*, 1956, #209)

388. HIGHER FUNCTIONS OF THE CENTRAL NERVOUS SYSTEM
Lindsley, D. B.
***Annual Review of Physiology*, v. 17, pp. 311–338, 1955**

The literature reviewed is organized and discussed in terms of two major topics: theoretical considerations of brain and neuron organization and the problem of behavior, and experiments bearing on excitability and scanning role of alpha rhythm in relation to behavior and psychological processes. 68 references. (*PsyA*, 1956, #223)

389. PANEL DISCUSSION: RECENT CONCEPTS OF CENTRAL NEUROPHYSIOLOGY; THEIR BEARING ON PSYCHOSOMATIC PHENOMENA; AN INTERPRETATIVE COMMENTARY AND SUMMARY
Glaser, G. H.
***Psychosomatic Medicine*, v. 17, pp. 337–346, 1955**

The author provides an overview of the interrelationships between the "brain-stem mechanisms, limbic system, hypothalamic-endocrine system, and respiratory mechanisms" with psychological functions, including levels of alertness, memory, and symbolic processes, as developed by the panel's speakers at the American Psychosomatic Society in New Orleans, March 27–28, 1954. (*PsyA*, 1956, #5033)

390. NEURAL BASIS OF BILATERAL PERCEPTUAL INTEGRATION
Myers, R. E.
***Science*, v. 122, p. 877, 1955**

391. NOVYE DANNYE PO FIZIOLOGII VNESHNIKH I VNUTRENNIKH ANALIZATOROV (NEW DATA ON THE PHYSIOLOGY OF THE EXTERNAL AND INTERNAL ANALYZERS)
Airapetiants, E. Sh.
***Zhurnal Vysshei Nervnoi Deiatelnosti*, v. 5(5), pp. 644–652, 1955**

Recently obtained data on the "interconnection and interaction of . . . the signals [from the internal and external receptors] in the cortex of the brain" are presented. The "smooth flow of behavioral acts" necessitates a "special cortical analysis and synthesis of the internal state and together with this the possession of definite apparatuses in the large hemispheres of the brain" which can "systematize the flow of impulses from the periphery of the great internal territory of the organism." (*PsyA*, 1957, #2148)

392. BRAIN MECHANISMS IN DIACHROME
Krieg, W. J. S.
Brain Books, Evanston, Ill., 1955

This is an introductory textbook of neuroanatomy organized according to functional systems. There is short discussion of comparative material as well as 56 halftone illustrations, many of them three-dimensional, interspersed in the text, and two sets of reconstructions. (*PsyA*, 1957, #4114)

393. HIGHER FUNCTIONS OF THE NERVOUS SYSTEM
Jasper, H., Gloor, P., and Milner, B.
***Annual Review of Physiology*, v. 18, pp. 359–386, 1956**

Material reviewed is organized and discussed under the following major headings: Reticular System, The Rhinencephalon, Rhinencephalon and Behavior, Memory Mechanisms, Localization of Function in Neocortex, and Hallucinogenic and Adrenolytic Compounds in Certain Mental Disorders. 180 references. (*PsyA*, 1957, #2170)

394. ELECTRICAL ACTIVITY OF THE BRAIN
Frost, L.
***Psychiatric Research Reports*, no. 3, pp. 4–6, 1956**

The nature and manner of stimulation of the reticular system in relation to the limbic system, the thalamus, and the cortex are areas currently in greatest need of research. Results might well clarify problems in psychiatry insofar as they relate to neuroanatomy in brain function. (*PsyA*, 1957, #5443)

395. THE ORGANIZATION OF THE CEREBRAL CORTEX
Sholl, D. A.
John Wiley & Sons., Inc., New York, N. Y., 1956

396. SOME BREACHES IN THE ACTIVITY OF THE NERVOUS SYSTEM USING EXAMPLES OF VISUAL AGNOSIA
Chlenov, L. G.
March 22, 1957
Moscow University Mathematical Computing Faculty Seminar, 1956–1957
To be published in *Problems of Cybernetics*

397. THE INTRINSIC SYSTEMS OF THE FOREBRAIN. AN ALTERNATIVE TO THE CONCEPT OF CORTICAL ASSOCIATION AREAS
Pribram, K. H.
June 1957
Report
American Physiological Society, Washington, D. C.
ASTIA AD-202,650

Evidence was presented to support the conception that the posterior and the frontal intrinsic systems serve different aspects of the problem solving process. The argument was forwarded that two major classes of behavior can be distinguished, discrimination and preferential. An experiment was performed which showed that posterior intrinsic sector resection interferes with discriminative behavior during search; such lesions affect the delineation of a problem. Frontal intrinsic sector resection interferes with preferential behavior after search is completed; such lesions affect the economic solution of a problem. The experiment further showed that the delineation and economic solution of a problem can occur more or less haphazardly. Haphazard behavior was described by the relatively wide range of systems of transformations of the inputs and outcomes of actions under which behavior

remains invariant. Strategic problem solution occurred with restriction of the range of such systems of transformations. The experiment was interpreted to indicate that restriction in this instance results from the operation of a mechanism that partitions the neural events determined by inputs and outcome. By providing both a referent and units, partitioning defined the range of possibilities to which an input or outcome is assigned by the organism.

398. CORTICAL RECEPTION OF TOUCH AND TASTE IN THE CAT
Cohen, M., Landgren, S., Ström, L., and Zotterman, Y.
***Acta Physiologica Scandinavica*, v. 40, Supplement 135, 1957**

399. PHYSIOLOGICAL PSYCHOLOGY
Stellar, E.
***Annual Review of Psychology*, v. 8, pp. 415–436, 1957**

A survey of the literature of the past year makes it clear that we actually are on the threshold of a significant breakthrough in our understanding of the neural basis of complex functions like consciousness, attention, learning, memory, and intelligence. This review, therefore, will concentrate on the year's progress in these important cognitive functions and, because of the limitations of space, will only briefly summarize the highlights of advances made in other facets of physiological psychology. (*PsyA*, 1958, #75)

400. NEUROBIOLOGIE ET PSYCHIATRIE (NEURO-BIOLOGY AND PSYCHIATRY)
Blanc, C.
***Evolution psychiatrique*, no. 4, pp. 625–652, 1957**

Neurobiology is criticized from a psychiatric viewpoint, because of an emphasis upon function rather than process. Specifically, recent animal experiments indicate that the following behaviors, originating in subcortical centers, can be modified: attention, fear, food-seeking, and instinctual. This data should be integrated with psychological processes, such as being, causality, and consciousness. In addition, anthropological studies, which would clarify the evolution of these processes, are needed. In conclusion, an interrelationship between these disciplines could help the psychiatrist most by focusing upon the most important criterion of pathology, the irreversibility of neurophysiological activities. (*PsyA*, 1959, #2601)

401. UEBER DIE WECHSELBEZIEHUNGEN VON KORTEX UND SUBKORTEX IN BEZUG AUF DIE ZENTRALEN REGULATIONEN (ON THE RECIPROCAL RELATIONSHIPS OF CORTEX AND SUBCORTEX AS REGARDS CENTRAL REGULATION)
Rüdiger, W.
***Psychiatre, Neurologie und medizinische Psychologie*, Leipzig, v. 9, pp. 195–203, 1957**

As developed in Pavlov's physiologically based conceptions, studies and research findings about the regulating functions of the higher central nervous system are reviewed with special emphasis on further investigative needs. (*PsyA*, 1959, #257)

402. NEKOTORYE REZULTATY MORFOFIZIOLOGICHESKIKH ISSLEDOVANII VYSSHIKH OTDELOV TSENTRALNOI NERVNOI SISTEMY ZHIVOTNYKH I CHELOVEKA (SOME RESULTS OF MORPHOPHYSIOLOGICAL STUDIES OF THE HIGHER DIVISIONS OF THE CENTRAL NERVOUS SYSTEM IN ANIMALS AND MAN)
Sarkisov, S. A.
***Zhurnal Vysshei Nervnoi Deiatelnosti*, v. 7, pp. 868–876, 1957**

A historical survey is provided of the experimental work done in the Soviet Union on the morphophysiology of the higher divisions of the central nervous system in animals and man. (*PsyA*, 1958, #4896)

403. OSNOVY SRAVNITELNOI FIZIOLOGII: SRFAVNITELNAIA FIZIOLOGIIA NERVNOI SISTEMY (BASES OF COMPARATIVE PHYSIOLOGY: COMPARATIVE PHYSIOLOGY OF THE NERVOUS SYSTEM)
Koshtoiants, Kh. S.
Akademiia Nauk SSSR, Moscow, Russia, 1957
(Translation to be published by Pergamon Institute, New York, N. Y.)

This is the second volume of "Bases of Comparative Physiology," whose revised edition of the first volume appeared in 1951. As an integrating text, it presents both old and new material. The point of view is Pavlovian. (*PsyA*, 1959, #205)

404. PSYCHOPHYSIOLOGY AND MOTIVATION
Lindsley, D. B.
1957
Nebraska Symposium on Motivation
Jones, M. R., Editor
University of Nebraska Press, Lincoln, 1957, pp. 44–105

405. PROBLEMY SOVREMENNOI FIZIOLOGII NERVNOI I MYSHECHNOI SISTEM (PROBLEMS OF CONTEMPORARY PHYSIOLOGY OF THE NERVOUS AND MUSCULAR SYSTEMS)
Narikashvili, S. P., Editor
Akademii Nauk Gruzinskoi SSR, Tbilisi, USSR, 1957

This volume is a collection of articles, dedicated to I. S. Beritashvili (Beritov) on the occasion of his 70th birthday. These articles include a number on the physiology of conditioned reflexes. Among the contributors are Adrian (writing on the transmission of olfactory information), Gannt (on cardiac activity in the elaboration of conditioned reflexes), and Herrick (on cortical generalization and analysis). (*PsyA*, 1958, #4889)

406. PROBLEMS AND METHODS OF PSYCHOPHYSICS
Stevens, S. S.
January 2, 1958
Harvard University, Psycho-Acoustic Lab., Cambridge, Mass.
PNR-190, Nonr-186,615
(See also *Psychological Bulletin*, v. 54, pp. 177–196, July 1958)
ASTIA AD-215,693

407. CENTRAL NERVOUS MECHANISMS IN COLOR VISIONS
Lennox, M. A.
1958
Air Force Office of Scientific Research, Washington, D. C.
TR 59-298
ASTIA AD-213,082

408. BASES PHYSIOLOGIQUES DES THEORIES DE L'AUDITION
Rosenblith, W. A.
1958–1959
Problemes de Psychophysiologie, Communication No. 7, Faculté des Sciences de Paris, France

409. OPTICS AND VISUAL PHYSIOLOGY
Linksz, A.
***A.M.A. Archives of Ophthalmology*, v. 59, pp. 901–969, 1958**

A 60-page summary of the literature on this subject for 1957. Cited are 300 titles of papers, books, and monographs. (*PsyA*, 1959, #7513)

410. THE PRESENT SITUATION IN BRAIN PHYSIOLOGY
Köhler, W.
***American Psychologist*, v. 13, pp. 150–154, 1958**

"At the present time, no evidence as to the nature of brain function can compare with our own, that is, the psychologists' evidence, and most of this the physiologists quietly ignore. They obviously do so in the conviction that the main principles of peripheral nervous function are also those of central function . . . I do not, of course, deny that impulses travel in axons of the brain just as they do in peripheral fibers. I merely suspect that, in addition, there are other forms of brain action and that, from the point of view of psychology, such other actions are no less important than the impulses." Cortical currents or fields differ from the more popular nerve impulses in three respects: (1) They do not follow the all-or-none principle which holds for impulses. The currents are graded processes. (2) Unlike the nerve impulses and the electric rhythms of cortical cells, "the currents shown in our records have not the form of short-lived waves; rather, they are quasi-steady states." (3) "While the currents spread freely in the tissue as a continuous medium, nerve impulses follow prescribed linear conductors, the nerve fibers." A number of neuropsychological studies concerning particularly figural aftereffects and neural fields are cited. (*PsyA*, 1959, #7420)

411. VISION
Riggs, L. A.
Annual Review of Psychology, v. 9, pp. 19–46, 1958

This review for the year ending April 1957 emphasizes the psychophysical and physiological approaches to vision. 181-item bibliography. (*PsyA*, 1958, #3702)

412. SOMATIC FUNCTIONS OF THE NERVOUS SYSTEM
Mountcastle, V. B.
Annual Review of Physiology, v. 20, pp. 471–508, 1958

The literature is reviewed and discussed in terms of the specific afferent systems: auditory system, visual system, pain, motor mechanisma, extrapyramidal systems—abnormal movements, brain stem influences upon segmental reflex actions, reflex activity of the spinal cord, cerebellum, regulation of activity levels in the CNS, diffuse thalamic projection system, intrinsic cortical mechanisms, and further aspects of electrocortical activity. 263 references. (*PsyA*, 1959, #5235)

413. O ROLI FIZIOLOGICHESKIKH PROTSESSOV V SETCHATKE I V KORE GOLOVNOGO MOZGA V FORMIROVANII SLEDOVYKH OSHCHUSHCHENII U CHELOVEKA (ON THE ROLE OF PHYSIOLOGICAL PROCESSES IN THE RETINA AND CEREBRAL CORTEX IN THE FORMATION OF TRACE SENSATIONS IN MAN)
Zagorul'ko, L. T., Zagorul'ko, T. M., and Mushkina, N. A.
Fiziologicheskii Zhurnal SSSR, v. 44, pp. 286–294, 1958

As a result of brief illumination of the eye, the following phenomena are observed: (1) "visual trace sensations," (2) "electrical trace phenomena" in the cerebral cortex (visual and elsewhere) which do not depend on the presence of trace sensations, and (3) skin-galvanic reflex which gradually undergoes extinction. These reactions follow wavelike courses which do not fully correspond to each other. The conclusion is tendered that in trace activity, the visual analyzer processes, taking place in the higher divisions of the brain, play a more essential role comparatively than those in the retina. (*PsyA*, 1959, #288)

414. VISCERAL BRAIN, ITS COMPONENT PARTS AND THEIR CONNECTIONS
Papez, J. W.
Journal of Nervous and Mental Disease, v. 126, pp. 40–56, 1958

The olfactory, visceral, hippocampal, and hypothalamic neural mechanisms and their interconnections are described in their functioning as the visceral brain or limbic lobe. Their role in subserving the biological needs of the individual are explained. (*PsyA*, 1959, #5191)

415. STUDIES ON THE 5-HYDROXYTRYPTAMINE (SEROTONIN) CONTENT IN HUMAN BRAIN
Costa, E. and Aprison, M. H.
Journal of Nervous and Mental Disease, v. 126, pp. 289–293, 1958

The presence of serotonin in human brain structures has been demonstrated. The areas of the allocortex had higher serotonin concentrations than the isocortex. The highest concentration of serotonin per unit weight of tissue is in the mesencephalic structures (mainly substantia nigra and probably red nucleus); the diencephalic structures (hypothalamus) contain also relatively large amounts of this neurohormone. The cerebellum as well as the isocortex have the lowest concentrations of serotonin. (*PsyA*, 1959, #7412)

416. PHYSIOLOGICAL BASIS OF FLICKER ELECTRORETINOGRAPHY AS APPLIED IN CLINICAL WORK
Granit, R.
Ophthalmologica, v. 135, pp. 327–348, 1958

The paper summarizes: essential properties of electroretinographic flicker fusion, fixation blindness, on-off characteristics naturally antagonistic, flicker rates in animals and humans, rod-cone functions, waveforms and types, stimulus area influences, brightness effects, the Ferry-Porter law, inhibitory and facilitatory wave effects, effects in single fibers, flicker as diagnostic in disease and drug afflictions, impulse frequencies in direct proportion to fusion frequencies, central as well as peripheral causes of *CFF*, discontinuity in the intensity-frequency functions, and the advantages of the resonance method. (*PsyA*, 1959, #7502)

417. PHYSIOLOGY OF THE CORPUS CALLOSUM
Bremer, F.
***Research Publication of the Association for Nervous and Mental Diseases*, v. 36, pp. 424–448, 1958**

Overt impairment following sectioning is slight; nevertheless the functioning of the corpus callosum is associated with the highest and most elaborate activities of the brain. (*PsyA*, 1959, #7408)

418. BIOLOGICAL AND BIOCHEMICAL BASES OF BEHAVIOR
Harlow, H. F. and Woolsey, C. N.
University of Wisconsin Press, Madison, 1958

All of the papers in this collection were presented at the University of Wisconsin Symposium on Interdisciplinary Research, the purpose of which was to interrelate current findings in the areas of anatomy, physiology, biochemistry, and behavior. The 20 articles in the volume are concerned primarily with contributions made by the various disciplines to the understanding of behavior, the emphasis being on experimental results relating behavior to the physiology, anatomy, and chemistry of the brain. (*PsyA*, 1959, #7202)

419. O FIZIOLOGICHESKIKH OSNOVAKH OSHCHUSHCHENII (ON THE PHYSIOLOGICAL BASES OF SENSATIONS)
Mogendovich, M. R.
***Voprosy Psikhologii*, v. 4(2), pp. 3–7, 1958**

Conditioned reflex studies, while revealing the physiological mechanisms behind association, do not lead directly to an understanding of the physiological nature of sensations, conceptions, and other mental functions. The belief that sensations are due solely to cortical activity is exaggerated, since subcortical regions make their contributions to their generation. A distinction between unconditioned and conditioned responses cannot be made on the basis of their conscious realization. Many unconditioned responses are consciously realized, while "not every conditioned reflex or connection-forming activity of the brain is conscious." Therefore, one must hold that the concept of reception is broader than that of sensation. However, consciousness is not to be viewed as epiphenomenal, nor should psychology find itself supplanted by physiology of higher nervous activity. (*PsyA*, 1959, #9480)

420. O MEKHANIZMAKH VZAIMODSEISTVIIA SIGNAL'NYKH SISTEM KORY MOZGA (ON THE MECHANISMS OF INTERACTION OF THE SIGNAL SYSTEMS OF THE CORTEX OF THE BRAIN)
Meleshko, S. D.
***Zhurnal Vysshei Nervnoi Deiatelnosti*, v. 8, pp. 353–357, 1958**

A study was made of interaction of the cortical signal systems in four third-grade children by means of the "motor method with verbal reinforcement . . . Interaction of the signal systems was achieved not only by means of mutual elective irradiation of excitation and inhibition from one signal system to the other and induction between them, but also by developing internal inhibition in one of the signal systems." It is concluded that "development of internal inhibition in conditioned connections or their complexes, combining the first and second signal systems," plays an important part in higher nervous activity of man. (*PsyA*, 1959, #5234)

421. RETICULAR FORMATION OF THE BRAIN
Amassian, V. E. and Waller, H. J.
Little, Brown and Co., Boston, Mass., 1958

422. LE CERVEAU HUMAIN (THE HUMAN MIND)
Chauchard, P.
Presses Universitaires de France, Paris, 1958

Many aspects of the human mind are discussed including cerebral structure and function, electro-nervo-activity and thought, principles of cerebral pathology and mental diseases, consciousness and brain. 32-item bibliography. (*PsyA*, 1959, #225)

423. THE WAKING BRAIN
Magoun, H. W.
Charles C. Thomas, Publisher, Springfield, Ill., 1958

424. BIBLIOGRAPHY OF RESEARCH REPORTS IN PSYCHOPHYSIOLOGICAL STUDIES, 1955–1958
Sperling, P. I.
March 16, 1959
Army Medical Research Lab., Fort Knox, Ky.
AMRL Report 359 (143 ref.)
ASTIA AD-213,196

425. **STUDY OF THE ORGANIZATION OF THE VISUAL SYSTEM IN RESPECT TO COLOR**
Lennox, M. A.
May 1959
Air Force Office of Scientific Research, Washington, D. C.
TR 59-34
ASTIA AD-213,037

426. **TONOTOPIC ORGANIZATION OF THE CAT AUDITORY CORTEX FOR SOME COMPLEX STIMULI**
Kiang, N. Y. S. and Goldstein, M. H., Jr.
***Journal of the Acoustical Society of America*, v. 31, pp. 786–790, 1959**

427. **WHAT THE FROG'S EYE TELLS THE FROG'S BRAIN**
Lettvin, J. Y., Maturana, H. R., McCulloch, W. S., and Pitts, W. H.
***Proceedings of the IRE*, v. 47, no. 11, pp. 1940–1951, 1959**

The concept that information is transmitted from the eye to the brain in the form of a mosaic of light which maps images focused on the retina in some sort of geometric pattern in the brain is re-examined. An alternative explanation, that the nervous apparatus of the eye itself is designed to detect certain patterns of light and that the optic fibers transmit only certain operational information about these patterns to the brain, is given. A series of experiments was conducted on the eye and brain of a frog to determine the nature of this transmitted information.

428. **THE CENTRAL NERVOUS SYSTEM AND BEHAVIOR: TRANSACTIONS OF THE FIRST CONFERENCE**
Brazier, M. A. B., Editor
Josiah Macy, Jr., Foundation, New York, N .Y., 1959

The first half of the conference is devoted to a history of Russian neurophysiology, illustrated by 107 plates. Special attention is devoted to Sechenov in a paper by Brazier; to Danilevsky, Wedensky, and Ukhtomsky by C. D. Leake; to Pavlov by W. H. Gannt; and to Bechterev by P. Yakovlev. The second half consists of papers and discussions of modern neurophysiological researches into the neural aspects of conditioning processes, especially those involving direct electrical stimulation of, and recording from, the brain. The major papers are by R. W. Doty, F. Morrell, and R. Galambos. H. W. Magoun was chairman of the conference. 5-page bibliography. (*PsyA*, 1959, #7407)

429. **BRAIN, MEMORY, LEARNING: A NEUROLOGIST'S VIEW**
Russell, R. W.
The Clarendon Press, Oxford, England, 1959

The problems in the physiology of learning and memory, and the functions of the parts of the brain, are considered in the light of abnormalities occurring with various kinds of head injuries and surgery. A chapter on the traumatic amnesias supplies material on the relative vulnerabilities of old and new memories.

MACHINE PERCEPTION—MAPPING

430. A NEW METHOD FOR ANALYZING PRINTED ENGLISH

Newman, E. B. and Gerstman, L. J.
March 13, 1952
Harvard University, Cambridge, Mass.
PLR-2, HFORL Reprint 6, AF 33(038)14343
ASTIA AD-110,933
(See also *Journal of Experimental Psychology*, v. 44, pp. 114–125, August 1952)

A new measure, the coefficient of constraint, is proposed which provides a limited but extremely useful estimate of the sequential dependencies in sequences of events, such as letters, which cannot be ordered into a metric scale. When the coefficient of constraint was calculated for a passage of printed English, a quite regular behavior of the coefficient was discovered which could be described by the expression $D(n) = 1/n^2$. A possible use of the coefficient of constraint is proposed by which an upper bound is set on the average information per letter in the text examined. This upper bound has both considerable resemblance to, and a few striking differences from, Shannon's estimate of the same function. Neither greater freedom nor greater constraint is discovered when sequences of letters are examined of a length greater than that of one word.

431. MAP COMPILATION, PHOTOGRAMMETRY AND INFORMATION THEORY

Williams, R. E., Kochen, M., and Rosenberg, P.
December 1, 1953–February 28, 1954
Paul Rosenberg Associates, Mount Vernon, N. Y.
Interim TR-3, DA 44-009-eng-1695
ASTIA AD-73,181

Possible electronic map compilation methods, automatic and semi-automatic, are studied for those cases in which the raw terrain information is taken from: (1) an unrectified aerial negative, (2) an aerial negative rectified by optical projection, (3) the ground directly, i.e., direct ground scanning. Tentatively, it appears that the first case would be very difficult to treat automatically by waveform matching only; the second would be considerably less difficult than the first; if successful, all three cases, particularly the third, would have important advantages as compared with conventional photogrammetric map compilation procedures. Additional mathematical considerations are presented concerning the spiral scan method for automatic recognition on aerial photographs.

432. VIDEO MAPPING AS A RADAR TOOL

Norris, S. F.
March 1954
Rome Air Development Center, Griffiss AFB, N. Y.
RADC TN 54-6
ASTIA AD-29,356

An electronic method is discussed for superimposing any desired line-type information on either a PPI or a B scan indicator radar display without interfering with normal radar signals. The map is composed of transparent lines on an opaque background which are made to conform with the radar-display maximum range scale by photographic reduction. The map is scanned by a CRT trace (flying spot) with a phototube beyond the map for converting the resultant light variations into corresponding video variations. The video signals are amplified and sent through a mixer stage where they are combined with the regular radar video signals for display on the PPI or B scope. The map information must be synchronized with radar information in both range and azimuth. Desirable CRT characteristics are small spot size, short screen persistence, fine-grain screen structure, and high light output in a portion of the color spectrum to which an available phototube is sensitive. A photomultiplier type of phototube is required because of the relatively low illumination available from the CRT. The CRT sweep circuit can be any arrangement that will produce 10- to 350-mi sweeps with good linearity (within 0.1 percent is desirable). In video mapping with target-tracking radar, generation of the map information can be accomplished with the map drive motor which can be regulated at any convenient constant speed independent of the usual antenna servo arrangement.

433. **TWINPLEX**
Scott, D. K.
***Photogrammetric Engineering*, v. 20, no. 5, pp. 782–789, December 1954**

Twinplex is stereoscopic projector and plotting device designed to use convergent low oblique photographs, i.e., photographs which are intentionally tilted but in which horizon does not appear; low oblique photographs used in Twinplex obtained with pair of cameras coupled rigidly together; these cameras may be oriented along flight line for precision mapping or transversely for reconnaissance mapping. (*EI*, 1955)

434. **MEASUREMENT OF SECOND-ORDER PROBABILITY DISTRIBUTIONS OF PICTURES BY DIGITAL MEANS**
Stoddard, J. C.
July 13, 1955
Massachusetts Institute of Technology, Cambridge
TR 302, DA 36-039-sc-64637
ASTIA AD-111,879

The transmission of a picture was approached from the point of view of statistics and information theory. A picture was approximated by the processes of sampling and quantizing the video waveform that represents the intensity of the picture as it is scanned. Transmission of each sample of the picture is reduced to the problem of sending a number that indicates which of the 32 possible intensity levels occurred in that sample. Equipment that measures the second-order probability distribution of a video waveform from a facsimile transmitter by digital means was designed and built. System tests were made to permit evaluation of the potential accuracy of measurement. Although perfectly repeatable results from a known waveform could not be obtained, measurement of the complete joint probability distribution of one picture was made by running the data until consistent results could be obtained for each set of levels. A value of entropy representing an upper bound to the information content of the picture was computed from the measured second-order probability distribution of intensity in adjacent samples.

435. **INFORMATION THEORY AND ELECTRONIC PHOTOGRAMMETRY**
Rosenberg, P.
***Photogrammetric Engineering*, v. 21, no. 4, pp. 543–555, September 1955**

Possibilities in electronic automation of map compilation; PRA TSS system devised to scan ground photoelectrically from aircraft, record terrain information as electrical signals on magnetic tape, and then automatically print photomosaic, carve relief model, and produce map to any desired projection; PRA spiral scan method for automatic study of shapes. (*EI*, 1955)

436. **GENERALIZATION OF PATTERN RECOGNITION IN A SELF-ORGANIZING SYSTEM**
Clark, W. A. and Farley, B. G.
Proceedings of the Western Joint Computer Conference, Los Angeles, Calif., March 1–3, 1955, pp. 86–91
Institute of Radio Engineers, New York, N. Y.

A learning system based on randomly interconnected neuron-like elements is considered. Further experiments are discussed concerning the abilities of this system to perform stimulus-generalization and pattern-recognition. The net is first organized with two distinct stimuli as described in the earlier experiment. The learning system is then inactivated and the response properties are studied with regard to stimuli similar, in the sense of overlap, to the organizing stimuli. Learning does turn out to spread well in accord with this notion of similarity, and the results are discussed in connection with possible application to a visual pattern recognition experiment.

437. **PATTERN RECOGNITION AND MODERN COMPUTERS**
Selfridge, O. G.
1955
Proceedings of the Western Joint Computer Conference, Los Angeles, Calif., March 1–3, 1955, pp. 91–93
Institute of Radio Engineers, New York, N. Y.

438. **PROGRAMMING PATTERN RECOGNITION**
Dinneen, G. P.
1955
Proceedings of the Western Joint Computer Conference, Los Angeles, Calif., March 1–3, 1955, pp. 94–100
Institute of Radio Engineers, New York, N. Y.

439. **IMAGE PROCESSING**
Kovasznay, L. S. G. and Joseph, H. M.
***Proceedings of the IRE*, v. 43, pp. 560–570, 1955**

440. AUTOMATIC MAP COMPILATION WITH AERIAL NEGATIVES
Williams, R. E. and Kochen, M.
July 20, 1956
Paul Rosenberg Associates, Mount Vernon, N. Y.
Final TR, DA 44-009-eng-2635(6)
ASTIA AD-105,166 (See also AD-74,488, AD-74,489, AD-93,976)

Two automatic map compilation systems which use similar components but which operate in conceptually different manners were devised. The Type 1 system consists of scanning units which locate corresponding points on two overlapping aerial negatives, a computer which finds the corresponding ground coordinates of these point pairs, and a facsimile section for printing a photomap while rescanning one of the aerial negatives. The Type 2 system, which was chosen in preference to the Type 1 system, finds true ground coordinates from picture coordinates. A fully correlated photomap is produced which derives its video information from the original aerial negatives and gets rectification, orientation, and relief corrections from an associated digital control-computer. This computer acts as an equation solver and also provides the timing and programming for all the other operations involved in the map compilation. An engineering study of the Type 2 system is recommended.

441. DETERMINATION OF REDUNDANCIES IN SET OF PATTERNS
Glovazky, A.
IRE Transactions on Information Theory, v. IT-2, no. 4, pp. 151–153, December 1956

442. CHARACTER RECOGNITION FOR BUSINESS MACHINES
Glauberman, M. H.
Electronics, v. 29, pp. 132–136, 1956

443. AUTOMATIC CONTOURING INSTRUMENTATION
DeMeter, E. R.
July 16, 1957
Army Engineer Research and Development Labs, Fort Belvoir, Va.
Report 1488-TR (Interim Report January 1950–June 1955)
ASTIA AD-140,102

Investigations and studies are described which were conducted in the design of automatic contouring equipment under contracts with Bausch and Lomb Optical Co., and Pickard and Burns, Inc. Details of design and performance information on the equipment are given. The studies showed that the development of a practical automatic contouring instrument is feasible.

444. THE DETERMINATION OF THE ORIENTATION OF THE SECOND OF TWO OVERLAPPING PHOTOGRAPHS TAKEN AT A SINGLE EXPOSURE STATION
Rosenfield, G. H.
August 19, 1957
Air Force Missile Test Center, Patrick Air Force Base, Florida
RCA Data Reduction TR-38, AFMTC TR-57-21
ASTIA AD-124,142

A precise solution to the problem of orientation of the second of two overlapping photographs taken at a single exposure station is developed and tested. The solution requires the absolute orientation of the first of the two photographs. Knowledge of the spatial position of the camera station is presumed. After solution for orientation of the second photograph relative to the first, the problem of absolute orientation of the second photograph is solved by a simple matrix multiplication. The determination utilizes a redundancy of data, a rigorous least squares solution, and differential techniques requiring iterations. The method is applicable to both aerial and terrestrial photogrammetry. A numerical example is included for purposes of illustration.

445. AUTOMATIC READING OF TYPED OR PRINTED CHARACTERS
Bailey, G. E. C. and Norrie, G. O.
1957
Convention on Electronics in Automation
British Institution of Radio Engineers, London

446. THE DESIGN OF LOGIC FOR THE RECOGNITION OF PRINTED CHARACTERS BY SIMULATION
Greanias, E. C., Hoppel, C. J., Kloomok, M., and Osborne, J. S.
***IBM Journal of Research and Development*, v. 1, no. 1, pp. 8–18, January 1957**
(See also *Proceedings of the Institution of Electrical Engineers*, v. 103, Part B, Supplement: Convention on Digital-Computer Techniques, April 1956)

Techniques involving use of punch cards for data storage; simulation tests of "proportional parts" system of recognition logic; identity of printed character is related to size and position of character elements detected by optical scanning; time sequence of coded video information is tested by logical circuitry against prescribed sequences for character recognition; system devised by aid of digital computer. (*EI*, 1957)

447. AUTOMATIC CONTOURING
Esten, R. D.
***Photogrammetric Engineering*, v. 23, no. 1, pp. 49–53, March 1957**

History of investigations and experiments in automatic contouring by engineer research and development laboratories introduces major problem of image matching in two overlapping presentations; matches are made by scanning projected stereo model; three methods of scanning are described—profile, horizontal, and contour; problems are presented in general terms with emphasis on photogrammetric aspects.

448. ON RECOGNITION OF INFORMATION WITH DIGITAL COMPUTER
Glantz, H. T.
***Journal of the Association for Computing Machinery*, v. 4, no. 2, pp. 178–188, April 1957**

Recognition of information or data patterns is a simple task for the least experienced human clerk (as for example in recognition of words though misspelled). There exists a vast discrepancy in power of discrimination exercised by digital computer and in that of a human being. For particular data recognition problem, a specialized form of discrimination was utilized to obtain practicable solutions with a computer. Possibilities for further development in this field are discussed. (*EI*, 1958)

449. CHARACTER RECOGNITION PROCEDURES SIMULATED AND TESTED BY COMPUTER
Kloomok, M. K., Greanias, E. C., Hoppel, C. H., and Osborne, J. S.
***Automation Progress*, v. 2, no. 4, pp. 158–163, April 1957**

"Proportional parts system" of recognition logic developed for use with various types of IBM data processing machines; system relates identity of character to relative size and position of character elements detected by serial scanning along vertical lines. (*EI*, 1957)

450. SYMBOL GENERATOR AND VIEWER
***Computers and Automation*, v. 6, no. 12, pp. 1, 7; v. 6, no. 12B, pp. 1, 3, December 1957**

451. OPTIMUM CHARACTER RECOGNITION SYSTEM USING DECISION FUNCTIONS
Chow, C. K.
***IRE Transactions on Electronic Computers*, v. EC-6, no. 4, pp. 247–254, December 1957**

452. DEVELOPMENTS IN ELECTRONIC READING MACHINES
***British Communications and Electronics*, v. 4, no. 5, pp. 276–278, 1957**

453. AN ELECTRONIC READING AUTOMATON
***Engineer*, v. 203, pp. 414–415, 1957**

454. RELIABLE CHARACTER SENSING SYSTEM FOR DOCUMENTS PREPARED ON CONVENTIONAL BUSINESS DEVICES
Shepard, D. H., Bargh, P. F., and Heasly, C. C., Jr.
***IRE Wescon Convention Record*, v. 1, Part 4 (Computers), pp. 111–120, 1957**

455. CONSIDERATIONS IN THE DESIGN OF CHARACTER RECOGNITION DEVICES
Greanias, E. C. and Hill, Y. M.
***IRE Wescon Convention Record*, v. 5, Part 4 (Computers), pp. 119–126, 1957**

456. AUTOMATIC MAP COMPILATION SYSTEM. EXPERIMENTAL STUDY OF PROFILES AND MATCH ERROR CURVES
Williams, R. E. and Rosenberg, P.
December 10, 1956–January 31, 1958
Paul Rosenberg Associates, Mount Vernon, N. Y.
Final Report, DA 44-009-eng-3154
ASTIA AD-219,264

Profiles and match error curves of the automatic map compilation system for aerial negatives were investigated with experimental laboratory equipment. The experiments performed demonstrate that the automatic map compilation system can track profiles electronically through difficult terrain on aerial diapositive plates. Good resolution and sensitivity are obtained in electronic scanning and matching. The experimental laboratory equipment used in this study gives a C factor of 650. The system should eventually give C factors considerably greater than 1000.

457. AUTOMATIC MAP COMPILATION SYSTEM
Williams, R. E. and Rosenberg, P.
May 2–November 1, 1958
Paul Rosenberg Associates, Mount Vernon, N. Y.
Interim TR-1, DA 44-009-eng-3504
ASTIA AD-211,711

A complete laboratory model of the automatic map compilation system is being engineered and constructed. By separation of the coordinate equations into two parts requiring different degrees of computational accuracy, an analog computer can be used as the control computer of the system. A digital type computer was chosen, however, because of its superiority for use in this system. Tests with simulated signals demonstrate that a newly modified matching circuit operates satisfactorily with single-raster scanning. Electronic circuit details are reported for the unblanking chassis, preamplifiers, matching chassis, sawtooth sweep generator, and other circuits under construction as parts of the system. Specific equipments are being studied for the tape transport, tape recording, and reproduction components of the system.

458. ONE THOUSAND CHARACTERS PER SECOND
Computers and Automation, v. 7, no. 12, pp. 1, 6, December 1958

459. THE USE OF THE IBM 704 IN THE SIMULATION OF SPEECH-RECOGNITION SYSTEMS
Shultz, G. L.
1958
Proceedings of the Eastern Joint Computer Conference, Washington, D. C., December 9–13, 1957, pp. 214–218
Institute of Radio Engineers, New York, N. Y.

460. AUTOMATIC VOICE READOUT SYSTEM
Poppe, C. W. and Suhr, P. J.
1958
Proceedings of the Eastern Joint Computer Conference, Washington, D. C., December 9–13, 1957, pp. 219–221
Institute of Radio Engineers, New York, N. Y.

461. EXPERIMENTS IN PROCESSING PICTORIAL INFORMATION WITH DIGITAL COMPUTER
Kirsch, R. A., Cahn, L., Ray, C., and Urban, G. H.
1958
Proceedings of the Eastern Joint Computer Conference, Washington, D. C., December 9–13, 1957, pp. 221–229
Institute of Radio Engineers, New York, N. Y.

462. DEVICES FOR READING HANDWRITTEN CHARACTERS
Dimond, T. L.
1958
Proceedings of the Eastern Joint Computer Conference, Washington, D. C., December 9–13, 1957, pp. 232–237
Institute of Radio Engineers, New York, N. Y.

463. AUTOMATIC REGISTRATION IN HIGH-SPEED CHARACTER SENSING EQUIPMENT
Tersoff, A. I.
1958
Proceedings of the Eastern Joint Computer Conference, Washington, D. C., December 9–13, 1957, pp. 238–242
Institute of Radio Engineers, New York, N. Y.

464. THE USE OF THE FOURIER TRANSFORM IN THE ANALYSIS OF VISUAL PHENOMENA
Gilmore, H. F.
University of Michigan Symposium on Pattern Recognition, Ann Arbor, 1958

465. RECENT WORK ON READING MACHINES FOR DATA PROCESSING
Broido, D.
Automation Progress, v. 4, pp. 183–185, 224–226, 1958

466. RECOGNITION OF CHARACTERS PRINTED IN MAGNETIC INK
Hagopian, R. H.
Automation Progress, v. 3, pp. 332–334, 1958

467. COMPARISON OF CERTAIN POSSIBILITIES FOR TRANSMITTING SIMPLE PICTURES
Kharkevich, A. A.
Elektrosvyaz, no. 5, pp. 44–47, 1958

468. A REAL TIME SPEECH INPUT FOR A DIGITAL COMPUTER
Forgie, J. W.
Journal of the Acoustical Society of America, v. 30, pp. 668–669, 1958

469. AUTOMATIC RECOGNITION OF PHONETIC PATTERNS IN SPEECH
Dudley, H. and Balashek, S.
Journal of the Acoustical Society of America, v. 30, pp. 721–732, 1958

470. AUTOMATISCHE ZEICHENERKENNUNG
Steinbuch, K.
Nachrichtentechnische Zeit, v. 11, no. 4, pp. 210–219, 1958; no. 5, pp. 237–244, 1958

471. A COMPUTER ORIENTED TOWARD SPATIAL PROBLEMS
Unger, S. H.
Proceedings of the IRE, v. 46, no. 11, pp. 1744-1750, 1958

472. INSTRUMENTATION OF THE INTEGRATED MAPPING SYSTEM
Tregerman, L. and Merchant, D. C.
January 29, 1959
Fairchild Camera and Instrument Corp., Syosset, N. Y.
Interim TR 1, Report SME AA 21,
DA 44-009-eng-3766
ASTIA AD-211,616

Equipment is to be developed which will obtain from a stereoscopic exercise, through the act of profiling, useful output products for the production of topographic maps. Tests were initiated which will furnish quantitative data upon which to base conclusions in the two unresolved areas which remain, i.e., the mounting of the vidicon camera, and the apparent discrepancy of the measuring mark elevation when scanning left to right compared to the elevations measured in scanning right to left.

473. LEARNING MACHINES
Wireless World, v. 65, pp. 8–9, January 1959

A conditional-probability computer and character-recognition machines, exhibited at the symposium on "The Mechanization of Thought Processes" held at the National Physical Laboratory, Teddington, England, November 24–27, 1958, are discussed.

474. NUMERICAL ORIENTATIONS OF A STRIP OF THIRTY SIMULATED PHOTOGRAPHS
Lortie, E. L.
March 1959
Ballistic Research Labs, Aberdeen Proving Ground, Md.
Memorandum Report 1145, TB3-0538
ASTIA AD-216,041

To facilitate the establishment of a universal code for the analytical solution of the general photogrammetric problem, the coordinates of 504 image points in 30 simulated photographs were computed. These photographs simulate a strip with ⅔ overlap taken over a simulated terrain. Thirty resections in space were computed providing an independent check on the mathematical rigidity of the solution. Random measuring errors were then applied to the computed plate coordinates and the 30 resections repeated, resulting in the most probable orientations and residuals.

475. PATTERN RECOGNITION BY MEANS OF AUTOMATIC ANALOGUE APPARATUS
Taylor, W. K.
Proceedings of the IEE, Part B, v. 106, no. 26, pp. 198–209, March 1959

476. MACHINE RECOGNITION OF HAND SENT MORSE CODE
Gold, B.
IRE Transactions on Information Theory, v. IT-5, pp. 17–24, March 1959

477. AN ELECTRONIC READING MACHINE
Wada, H., Takahashi, S., Iijima, T., Okumura, Y., and Imoto, K.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 227–232

478. A QUASI-TOPOLOGICAL METHOD FOR RECOGNITION OF LINE PATTERNS
Sherman, H.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 232–238

479. AN ANALOGOUS METHOD FOR PATTERN RECOGNITION BY FOLLOWING THE BOUNDARY
Sprick, W. and Ganzhorn, K.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 238–244

480. ON THE RECOGNITION OF SPEECH BY MACHINES
Hughes, G. W. and Halle, M.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 252–256

481. THE POTENTIAL FIELD AS AN AID TO CHARACTER RECOGNITION
Kazmierczak, H.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, p. 244–247

482. INFORMATION-THEORY ASPECTS OF CHARACTER READING
Frankel, S.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 248–251

483. THE ACM-52 AUTOMATIC CLUTTER MAPPER AND PRELIMINARY EXPERIMENTAL RESULTS
Harris, J. N. and Madle, E. J.
July 30, 1959
Massachusetts Institute of Technology, Lincoln Lab., Lexington
TR 206, AF 19(604)5200
ASTIA AD-230,025

The ACM-52 Automatic Clutter Mapper is a special-purpose, digital-data processing system. The ACM-52 accepts, stores and processes up to eight complete scans (frames) of slowed-down video (SDV) data. A fixed, but readily adjustable, program causes the stored information to be processed so as to yield a mapping function. This function can then be used to blank out portions of a display where returns occur too frequently—a characteristic of certain types of clutter. Preliminary experimental results indicate the usefulness and flexibility of ACM-52 as a research tool in investigating the nature of SDV clutter. Its current use at a test site may indicate the possibility of using this technique to replace a similar task now performed by a human operator.

484. FORMULATION OF A SEMI-AUTOMATIC TOPOGRAPHIC DATA PROCESSING SYSTEM FOR THE ARMY IN THE 1965–1975 DECADE
Bassett, J. D., Brooks, F. C., et al.
August 19, 1959
Technical Operation, Inc., Arlington, Mass.
Report TO-B 59-10, DA 44-009-eng-3503
ASTIA AD-220,320

The final phase of a two-phase study program, resulting in the formulation of a semi-automatic topographic data processing system (SATDPS) for use by the future Army in the field is reported. Results of the Phase I study are summarized, and the objectives of the final system are set forth. Desired system capabilities, the capabilities of available components and subsystems, and the manner in which they may be used to attain the desired system performance are discussed. Details of component characteristics, including mapping, storage, computer, communications, and display devices, along with estimates of performance rates and amounts of equipment required are included. The role of computing equipment in the SATDPS is discussed. Flow diagrams are shown. A test system for 1961, a specific system for 1965, and suggestions for future development are given.

485. QUARTERLY PROGRESS REPORT INFORMATION PROCESSING
September 15, 1959
Massachusetts Institute of Technology, Lincoln Lab, Lexington
AF 19(604)-5200, AFCRC-TN-59-1014

Progress is reported (briefly in some cases), in computer development, analysis of systems, magnetic-film engineering, development and testing of magnetic materials and semiconducting components, data processing, pattern recognition and psychology.

486. PATTERN DETECTION AND RECOGNITION
Unger, S. H.
***Proceedings of the IRE*, v. 47, no. 10, pp. 1737–1752, October 1959**

Two types of pattern-processing problems are discussed in this paper. The first, termed "pattern detection," consists of examining an arbitrary set of figures and selecting those having some specified form. The second problem, "pattern recognition," consists of identifying a given figure which is known to belong to one of a finite set of classes. This is the problem encountered when reading alphanumeric characters.

Both recognition and detection have been successfully carried out on an IBM 704 computer which was programmed to simulate a spatial computer (a stored-program machine comprised of a master control unit directing a network of logical modules). One of the programs tested consisted of a recognition process for reading hand-lettered sans-serif alphanumeric characters. This process permits large variations in the size, shape, and proportions of the input figures and can tolerate random noise when it is well scattered in small specks.

Programs for detecting L-shaped (or A-shaped) figures in the presence of other randomly drawn patterns have also been successfully tested.

487. RESULTS OBTAINED FROM A VOWEL RECOGNITION COMPUTER PROGRAM
Forgie, J. W. and Forgie, C. D.
***Journal of the Acoustical Society of America*, v. 31, no. 11, pp. 1480–1489, November 1959**

Although this study involves sound recognition, it includes techniques of plurality vote, confusion resolving and decision that may be applicable to other forms of perception.

488. MACHINE PERCEPTION OF PRINTED AND HANDWRITTEN FORMS BY MEANS OF PROCEDURES FOR ASSESSING AND RECOGNIZING GESTALTS
Uhr, L.
Paper presented at the Association for Computing Machinery, Boston, Mass., 1959

489. PROCEEDINGS OF THE FIFTH ANNUAL COMPUTER APPLICATIONS SYMPOSIUM, OCTOBER 29–30, 1958
1959
Illinois Institute of Technology, Armour Research Foundation, Chicago
Meetings-CAS, Fifth Annual Meeting: Computers and Data Handling

Papers from this symposium were presented under the subject classifications of business and management applications and engineering and scientific applications. R. L. Harrells' paper on character-recognition devices, and part of "Frontiers in Computer Technology," by R. W. Hamming, are concerned with the subject of perception by computer.

490. PATTERN AND CHARACTER RECOGNITION SYSTEMS PICTURE PROCESSING BY NETS OF NEURON-LIKE ELEMENTS
Kamentsky, L. A.
Proceedings of the Western Joint Computer Conference, San Francisco, Calif., March 3–5, 1959, pp. 304–309
Institute of Radio Engineers, New York, N. Y.

491. SOME COMMUNICATION ASPECTS OF CHARACTER-SENSING SYSTEMS
Heasley, C. C., Jr.
Proceedings of the Western Joint Computer Conference, San Francisco, Calif., March 3–5, 1959, pp. 176–180

492. A GENERALIZED SCANNER FOR PATTERN AND CHARACTER-RECOGNITION STUDIES
Highleyman, W. H. and Kamentsky, L. A.
Proceedings of the Western Joint Computer Conference, San Francisco, Calif., March 3–5, 1959, pp. 291–294

493. THE DESIGN AND OPERATION OF THE MECHANICAL SPEECH RECOGNIZER AT UNIVERSITY COLLEGE, LONDON
Denes, P.
Journal of the British IRE, v. 19, pp. 219–229, 1959

494. A SYSTEM FOR THE AUTOMATIC RECOGNITION OF PATTERNS
Grimsdale, R. L., Sumner, F. H., Tunis, C. J., and Kilburn, T.
Proceedings of the IEE, Part B, v. 106, no. 26, pp. 210–221, 1959

A method is described for automatic recognition of spatial patterns that is designed to be flexible enough to identify, and thus to "perceive," any form. The recognition logic is explained, and examples are presented.

A more complete abstract is available in *Behavioral Science* for January 1960.

495. RECOGNITION OF IMAGES
Kharkevich, A. A.
Radiotekhnika, v. 14, no. 5, pp. 12–22, May 1959

496. ON THE PRINCIPLES OF DESIGNING READING MACHINES
Kharkevich, A. A.
Radiotekhnika, v. 15, no. 2, pp. 4–9, February 1960

The paper poses and briefly discusses certain general problems relating to the design of reading machines, i.e., machines which automatically recognize letters and digits on the basis of their configurations.

A translation of this article appears in *Automation Express*, v. 2, no. 8, pp. 17–22, May 1960.

497. ON THE PRINCIPLES OF DESIGNING A MACHINE FOR RECOGNIZING IMAGES
Fain, V. S.
Radiotekhnika, v. 15, no. 3, pp. 13–17, March 1960

The paper analyzes the problem of designing a machine which operates according to the "parallel method." Fundamental postulates are developed which determine an expedient method of design, and a network variant designed on the basis of these postulates is analyzed. The network is compared with the human eye.

Excerpts are presented in *Automation Express*, v. 2, no. 9, pp. 7–9, June 1960.

498. PATTERN RECOGNITION BY MACHINE
Selfridge, O. G. and Neisser, U.
Scientific American, v. 203, no. 2, pp. 60–68, August 1960

499. PATTERN RECOGNITION AND READING BY MACHINE
Bledsoe, W. W. and Browning, I.
Proceedings of the Eastern Joint Computer Conference, Boston, Mass., December 1–3, 1959
Institute of Radio Engineers, New York, N. Y., 1960

500. ALPHA-NUMERIC CHARACTER RECOGNITION USING LOCAL OPERATIONS
Bomba, J. S.
Proceedings of the Eastern Joint Computer Conference, Boston, Mass., December 1–3, 1959
Institute of Radio Engineers, New York, N. Y., 1960

501. USE OF A COMPUTER TO DESIGN CHARACTER RECOGNITION LOGIC
Evey, R. J.
Proceedings of the Eastern Joint Computer Conference, Boston, Mass., December 1–3, 1959
Institute of Radio Engineers, New York, N. Y., 1960

502. DISCUSSION OF PROBLEMS IN PATTERN RECOGNITION
Selfridge, O. G., Neisser, U., Kirsch, R., and Minsky, M.
Proceedings of the Eastern Joint Computer Conference, Boston, Mass., December 1–3, 1959
Institute of Radio Engineers, New York, N. Y., 1960

THE PERCEPTRON

503. THE PERCEPTRON: A THEORY OF STATISTICAL SEPARABILITY IN COGNITIVE SYSTEMS
Rosenblatt, F.
Cornell University, Aeronautical Lab, Buffalo, N. Y.
January 1958
R-VG-1196-G-1, Nonr-2381(00)

Background information and the design of the perceptron are presented in this report. The perceptron is the computer developed at Cornell which has the capacity for recognition or identification—its ability to say that a new set of data, stimulus pattern, situation, or problem is similar to some class or type which it has previously encountered, even in the absence of a specifically enumerated set of criteria.

504. THE DESIGN OF AN INTELLIGENT AUTOMATON
Rosenblatt, F.
Research Trends, pp. 1–7, Summer 1958
(See also *Aero/Space Engineering*, p. 76, January 1959)

Description of the design and operation of the perceptron—a machine which senses, recognizes, remembers, and responds like the human mind. Possible applications are discussed.

505. TWO THEOREMS OF STATISTICAL SEPARABILITY IN THE PERCEPTRON
Rosenblatt, F.
September 1, 1958
Cornell University, Aeronautical Lab, Buffalo, N. Y.
R-VG-1196-G-2, Nonr-2381(00)

The perceptron, a model of a system which is primarily concerned with the recognition of the forms, sounds, and other stimuli which make up the ordinary physical world, is a system based on the "theory of statistical separability." This report describes the mathematical background, or theory, behind the organization and the organization and significance of the perceptron.

506. THE PERCEPTRON: A PROBABILISTIC MODEL FOR INFORMATION STORAGE AND ORGANIZATION IN THE BRAIN
Rosenblatt, F.
Psychological Review, v. 65, no. 6, pp. 386–408, November 1958

To answer the questions of how information about the physical world is sensed, in what form is information remembered, and how does information retained in memory influence recognition and behavior, a theory is developed for a hypothetical nervous system called a perceptron. The theory serves as a bridge between biophysics and psychology. It is possible to predict learning curves from neurological variables and vice versa. The quantitative statistical approach is fruitful in the understanding of the organization of cognitive systems. 18 references. (*PsyA*, 1959, #9865)

507. PERCEPTUAL GENERALIZATION OVER TRANSFORMATION GROUPS
Rosenblatt, F.
Proceedings of an Interdisciplinary Conference, May 5–6, 1959, Chicago, Ill.
In "Self Organizing Systems"
Yavits, M. C., Editor
Pergamon Press, New York, N. Y., 1960, pp. 63–100

508. ON THE CONVERGENCE OF REINFORCEMENT PROCEDURE IN SIMPLE PERCEPTRONS
Rosenblatt, F.
1960
R-VG-1196-G4
Cornell University, Aeronautical Lab, Buffalo, N. Y.

509. THE MARK I PERCEPTRON
Hay, J. C. and Wightman, C. W.
Research Trends, v. 8, no. 1, pp. 1–4, Index Issue, Spring 1960

510. PERCEPTRON SHOWS ITS ABILITY TO LEARN
Klass, P. J.
***Aviation Week*, v. 73, no. 1, pp. 72–73, 75–77, 80, July 4, 1960**

"Corrective training" is used in teaching the Mark I perceptron to discriminate between different shaped objects and to identify them without prior knowledge of their form, in much the same way that a child learns.

AUTOMATIC TRANSLATORS

511. COMPUTER OPERATIONS REQUIRED FOR MECHANICAL TRANSLATION
Parker-Rhodes, A. F.
Proceedings of the IEE, Part B, v. 103, Supplement 1, pp. 1–164, Supplement 2, pp. 165–356, 1956; Supplement 3, pp. 357–536, 1956

512. A PROGRAMME FOR BRAILLE TRANSCRIPTION
Cleave, J. P.
Proceedings of the Third Symposium on Information Theory, Royal Institution, London, September 12–16, 1955
In "Information Theory," Cherry, C., Editor
Academic Press, New York, N. Y., 1956, pp. 184–194

Simplified grade one-and-a-half Braille was programmed upon a computer. The general principles are applicable to higher Braille systems. The search and comparison functions of the program are related to mechanical translation. (*PsyA*, 1957, #4587)

513. PSEUDO-CODE TRANSLATION ON MULTI-LEVEL STORAGE MACHINES
Duncan, F. G. and Hawkins, E. N.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 144–152

514. A REDUCTION METHOD FOR NON-ARITHMETIC DATA, AND ITS APPLICATION TO THESAURIC TRANSLATION
Parker-Rhodes, A. F. and Needham, R. M.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 321–326

515. RESEARCH ON AUTOMATIC TRANSLATION AT THE HARVARD COMPUTATION LABORATORY
Giuliano, V. E. and Oettinger, A. G.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 163–183

516. THE COMIT SYSTEM FOR MECHANICAL TRANSLATION
Yngve, V. H.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 183–187

517. ENGLISH–JAPANESE MACHINE TRANSLATION
Takahashi, S., Wada, H., Tadenuma, R., and Watanabe, S.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 194–199

518. MACHINE TRANSLATION METHODS AND THEIR APPLICATION TO AN ANGLO–RUSSIAN SCHEME
Belskaya, I. K.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 199–217

519. MECHANICAL TRANSLATION AND ITS IMPLICATIONS IN DATA PROCESSING
Booth, A. D.
Automatic Data Processing, v. 1, no. 6, p. 18, July 1959

This article traces the development of language translation by computer. Some of the techniques are described. The effect of automatic translation on dictionary making is noted. Some commercial uses of automatic translation are listed.

520. THE FIRST ALL-UNION CONFERENCE ON MATHEMATICAL LINGUISTICS
Lomkovskaia, M. V.
Uspekhi Matematicheskoye Nauk, v. 14, no. 6, pp. 213–222, November–December 1959

The following papers may be of interest to persons working in the field of artificial intelligence: "Machine Language and the Plan of the Contents (On Methods for Producing a Self-Learning Machine-Translator)," G. P. Melnikov; "The Problem of the Principles for Designing Specialized Electronic Computers for Machine Translation," I. L. Bratchikov; "A High Speed Universal Computer Using Magnetic Elements as a Decision Device for a Universal Logic Machine," N. N. Rikko; and "The Block Diagram of the Japanese Translating Machine, 'Yamato'," A. A. Babintsev.

521. LEVIATHAN: A SIMULATION OF BEHAVIORAL SYSTEMS TO OPERATE DYNAMICALLY ON A DIGITAL COMPUTER
Rome, B. K. and Rome, S. C.
March 1960 (in press)
Proceedings of the International Conference for Standards on a Common Language for Machine Searching and Translation, September 6–12, 1959

MODELS AND THEORIES OF PERCEPTION

522. FIGURAL AFTER-EFFECTS: AN INVESTIGATION OF VISUAL PROCESSES
Köhler, W. and Walach, H.
Proceedings of the American Philosophical Society, v. 88, pp. 269–357, 1944

523. VISION AND SEEING
Luckiesh, M.
D. Van Nostrand Co., Inc., New York, N. Y., 1944

524. HOW WE KNOW UNIVERSALS. THE PERCEPTION OF AUDITORY AND VISUAL FORMS
McCulloch, W. S. and Pitts, W. H.
Bulletin of Mathematical Biophysics, v. 9, pp. 127–147, June 1947

525. LEARNING AND RETENTION OF AN "UNEXPECTED" CONTROL DISPLAY RELATIONSHIP UNDER STRESS CONDITIONS
Vince, M. A.
1950
Medical Research Council, Applied Psychological Unit, Psychology Lab., Cambridge, England
R 125/50

526. THE PERCEPTION OF THE VISUAL WORLD
Gibson, J. J.
Houghton Mifflin Co., Boston, Mass., 1950

527. THE EFFECTS OF AUDITORY-VESTIBULAR NERVE PATHOLOGY ON SPACE PERCEPTION
Mann, C. W.
August 15, 1951
Tulane University, New Orleans, La.
Report 22, N7-onr-434 1

528. A TEORIA BINARIA DA PERCEPCÃO (THE BINARY THEORY OF PERCEPTION)
Campos, N.
Annario do Instituto de Psicologia, v. 1, pp. 13–14, 1951

This theory is an attempt, especially by Vittorio Benussi, to explain the Gestalt theory of perception. In perception, a psychical operation, impossible to know by introspection, is superimposed on the sensorial excitation. This "process of production" is a psychic act of organizing the sensorial foundation, producing the perceptive phenomenon of form or configuration. Thus a melody is perceived as a unity, not merely a series of disparate tones. (*PsyA*, 1956, #6469)

529. THE "DOUBLE THRESHOLD" METHOD OF DETECTION
Swerling, P.
December 17, 1952
RAND Corp., Santa Monica, Calif.
RM-1008

The "double threshold" method of detection is described. Probability of detection curves is computed for several cases.

530. A STATISTICAL DESCRIPTION OF NEURAL RESPONSES TO CLICKS RECORDED AT THE ROUND WINDOW OF THE CAT
McGill, W. J.
1952
Harvard University, Cambridge, Mass.
Thesis

531. EIN EXPERIMENTALER BEITRAG THEORIE DER DOPPELTEN STEURUNG VON BEWUSSTEIN UND WAHRNEHMUNG (EXPERIMENTAL CONTRIBUTION TO THE DUPLICITY THEORY OF CONSCIOUSNESS AND PERCEPTION)
Gellhorn, E.

Pflügers Archiven gesellschaftlicher Physiologie, v. 225, pp. 75–92, 1952
(See also *Ophthalmologic Literature*, v. 6, no. 7, p. 889, 1954)

532. STIMULUS-RESPONSE THEORY AS APPLIED TO PERCEPTION
Wickens, D. D.
"Kentucky Symposium: Learning Theory, Personality Theory, and Clinical Research," University of Kentucky, Lexington, March 13–14, 1953, pp. 22–35

This paper is an attempt to view the perceptual responses as mediating responses to which the overt responses are made, but which are predictable from a knowledge of the prior experiences of the organism. It is further assumed that the molecular postulates of *S-R* psychology, primarily the postulates dealing with reinforcement, nonreinforcement, and stimulus generalization, may be employed in making these predictions. An experimental study in selective perception or perceptual set is analyzed utilizing these formulations. (*PsyA*, 1955, #498)

533. PROPOSALS FOR A THEORY OF PICTORIAL PERCEPTION
Gibson, J. J.
May 1953
HFORL Memo Report 35, AF 33(038)22804
ASTIA AD-22,065

An attempt is being made to develop a systematic theory of pictorial perception for better understanding and prediction of the effects of audio-visual training materials. Theoretical considerations are presented and discussed under the headings: the production of surrogates; the consequences of surrogate-making for the perceiver and the producer; conventional and nonconventional surrogates; the fidelity of a model; the fidelity and scope of a picture; space in pictures; the unique viewing point for a picture; the approximation of pictorial perception to direct perception; the fidelity of chirographic pictures; and the advantages and disadvantages of realism in pictures. In this study, surrogate is defined as that stimulus which is produced by another individual but is relatively specific to some object, place, or event not at present affecting the sense organs of the perceiving individual.

534. HANDBOOK OF ACOUSTIC NOISE CONTROL. VOLUME II. NOISE AND MAN
Rosenblith, W. A., Stevens, K. N., et al.
June 1953
Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
Report, WADC-TR-52-204, AF 33(038)-20572

Human responses to noise are analyzed and correlated with properties of the physical stimuli.

535. PSYCHIATRIC SCREENING OF FLYING PERSONNEL: PERCEPTION AND PERSONALITY—A CRITIQUE OF RECENT EXPERIMENTAL LITERATURE
Nelson, H.
July 1953
School of Aviation Medicine, Randolph Field, Texas
Report 1, Project 21-0202-0007
ASTIA AD-19,669 (See also AD-19,615)

Recent experimental studies of perception which relate to personality were evaluated in respect to the following subjects: perception of self and of others, subception or discrimination below thresholds of awareness, altered perception in deviant and normal personalities, sex differences in perception, perception and intelligence, and inner determinants of perception. A theory of perceptual processes is presented with a quantitative formulation of the adaptation-level concept. Perceptual approaches to the study of anxiety are reviewed, with particular reference to AF psychiatric selection requirements.

536. A SURVEY OF RESEARCH ON IMPROVEMENT IN PERCEPTUAL JUDGMENTS AS A FUNCTION OF CONTROLLED PRACTICE AND TRAINING
Gibson, E. J.
November 1953
Cornell University, Ithaca, N. Y.
HRRC Research Bulletin 53-45, AF 33(038)22373
ASTIA AD-24,653

Studies concerning the effects of training on perceptual judgments are reviewed and grouped according to the areas affected: acuity; upper and lower limens; color discrimination; perception under conditions of impover-

ished stimulation; relative discrimination; and absolute judgment. Hypotheses concerning perceptual learning are discussed.

537. THE INFORMATION-HANDLING CAPACITY OF THE HUMAN AS A FUNCTION OF CERTAIN CHARACTERISTICS OF THE STIMULUS SET

McIntosh, B. B.
1953
Aviation Psychology Lab., Ohio State University, Research Foundation, Columbus
Thesis, AF 33(616)43
ASTIA AD-26,427

An analysis was made of the effect of the patterns formed by stimulus lights and the probabilities of occurrence of various lights on human information-transmission capacity. Subject responses were measured for seven stimulus sets which varied in the number of stimuli on the panel, the spatial relations between these stimuli, and the frequency of occurrence of each stimuli within the set. The sets were randomly presented at a prescribed rate to two subjects. Results were analyzed in terms of the frequency and type of response to each stimulus of each set. When the stimuli were varied in two-dimensional space (up-down, right-left), the information transfer was greater than when stimuli were varied unidimensionally. The rate was constant for one subject but dropped for the other when the number of stimuli was decreased and the rate of presentation was increased to approximate an equal amount of information input per unit time. The stimuli which gave the greatest amount of information transfer varied with set and subject. The maximum number of no-response type of error was made on end stimuli, and the maximum number of wrong or confusion responses were made on centrally located stimuli.

538. CONTRIBUTION A L'ETUDE DE LA FONCTION DU CERVEAU. TROUBLE DE LA VISION DES COULEURS ET DES FORMES (THE STUDY OF CEREBRAL FUNCTION. DISORDERS OF COLOUR VISION AND VISION OF FORMS)

Stenvers, H. W.
***Folia psychiatrica neerl.*, v. 56, pp. 514–518, 1953**
(See also *Ophthalmologic Literature*, v. 7, no. 7, 1955)

539. K KRITIKE SUBEKTIVNOGO METODA V FIZIOLOGII NERVNOI SISTEMY I ORGANOV CHUVSTV (A CRITICISM OF THE SUBJECTIVE METHOD IN THE PHYSIOLOGY OF THE NERVOUS SYSTEM AND OF THE SENSE ORGANS)

Zagorul'ko, L. T.
***Fiziologicheskii Zhurnal SSSR*, v. 39, no. 4, pp. 498–508, 1953**

A number of psychophysiologists are criticized for adherence to subjective, "anti-Pavlovian," "idealist" methods and conceptions in research on the sense organs. Thus, one may not attribute the ability to discern forms, visual details, etc. to an "intellectualization of the process of perception"; rather, one must attribute this ability to "processes of cortical differentiation." What is psychological in "physiological optics" lies in the "series of conditioned reflexes" which constitute the action of the visual analyzer. (*PsyA*, 1955, #5384)

540. IS THERE A MECHANISM OF PERCEPTUAL DEFENSE?

Postman, L., Bronson, W. C., and Gropper, G. L.
***Journal of Abnormal and Social Psychology*, v. 48, pp. 215–224, 1953**

This experiment was designed to answer the question whether there is any evidence for perceptual defense in word recognition when the factors of familiarity, set, and selective verbal report are taken into account. The experimental results fail to provide any support for a mechanism of perceptual defense. 18 references. (*PsyA*, 1954, #2283)

541. PERCEPTION, MOTIVATION, AND BEHAVIOR

Postman, L.
***Journal of Personality*, v. 22, pp. 17–31, 1953**

Our survey of the experimental evidence reaffirms and highlights the need for operational precision in the analysis of motivational factors in perception. Whatever the conceptual model with which we choose to work, the study of perception always involves manipulation of the stimulus, manipulation of the organism, and determination of response dispositions. The problems of perception and, indeed, the problems of cognition, are part and parcel of the problems of behavior. 40 references. (*PsyA*, 1954, #3734)

542. IMPROVEMENT IN PERCEPTUAL JUDGMENTS AS A FUNCTION OF CONTROLLED PRACTICE OR TRAINING
Gibson, E. J.
***Psychological Bulletin*, v. 50, pp. 401–431, 1953**

Literature is reviewed under the topics: evidence of improvement of perceptual judgment by practice; factors influencing improvement; transfer; retention. "That perceptual learning occurs under many conditions is clear, as also the fact that improved skill in discrimination is an important feature of such learning." The failure of various theories of perception to explain the facts is discussed. 211-item bibliography. (*PsyA*, 1955, #5390)

543. ON THE PROBLEM OF PERCEPTUAL DEFENSE
Postman, L.
***Psychological Review*, v. 60, pp. 298–306, 1953**

The author presents a critical review of the arguments in a recent article by Howie (see *PsyA*, 1953, #4809) on the perceptual defense concept. A review of the origin and status of the concept is presented first. This is followed by a breakdown of Howie's arguments into those dealing with operational, logical, and metaphysical issues. 24 references. (*PsyA*, 1954, #3733)

544. LA MOBILITE DES PROCESSUS NERVEUX DANS LES PARTIES CENTRALES ET PERIPHERIQUES DE L'ANALYSEUR VISUEL (THE MOBILITY OF NERVOUS PROCESSES IN THE CENTRAL AND PERIPHERAL PARTS OF THE VISUAL ANALYSER)
Smirnov, G. D.
***Raison*, no. 7, pp. 91–98, 1953**

The author describes in detail his investigations on the mobility of excitation in the visual analyser of frogs and rabbits. "The visual result of the action on the central nervous system of rhythmic discharges in groups of nervous impulses depends in great measure on the lability of nervous processes in various links of different analysers. The strength and quality of the perception of stimulation depend on this lability which has formed historically in the course of the more and more perfect adaptation of animals to the surrounding environment which realizes during the development of the organism." (*PsyA*, 1956, #3898)

545. PSIHOLOGIJA I NEKI PROBLEMI MARKSIZMA (PSYCHOLOGY AND SOME PROBLEMS OF MARXISM)
Zvonarević, M.
***Savremena Škola*, v. 8, pp. 17–34, 1953**

This article is a study of the role of psychology in proving the theorem of Marxism, and of the extent to which Marxism facilitates the understanding of scientific psychology facts. The author explains the historical development and the notion of perception in the light of dialectic materialistic philosophy. He sets forth the process by which the human brain reflects the objective world. He disputes the concept of "physiological idealism" by J. Müller, who has "interpreted in the wrong way the facts which are correct in themselves, neglecting the historical, evolutionary and social conditionality of our sensory organs." (*PsyA*, 1954, #3533)

546. EFFECT OF PHOTIC STIMULATION IN VISUAL PATHWAYS FROM RETINA TO CORTEX
Lindsley, D. B.
***Science*, v. 117, p. 469, 1953**

547. GESTALTBILDUNG UND STRUKTURERKENNTNIS (GESTALT FORM AND STRUCTURAL PERCEPTION)
Révész, G.
***Wiener Zeitschrift für Philosophie, Psychologie, Pädagogik*, v. 4, pp. 269–274, 1953**

In honor of Prof. Erismann's 70th birthday, the history and operational meanings of the terms "perception" and "apperception" are reconsidered in terms of philosophical, optical, phenomenological, and Gestalt influences. (*PsyA*, 1955, #1953)

548. *S-R* COMPATIBILITY: SPATIAL CHARACTERISTICS OF STIMULUS AND RESPONSE CODES
Fitts, P. M. and Seeger, C. M.
April 1954
Ohio State University Research Foundation, Columbus
Research Bulletin AFPTRC TR-54-8,
AF 33(038)10528
ASTIA AD-34,037

549. REPORTS OF RESEARCH IN THE FIELD OF ENGINEERING PSYCHOLOGY
Gatti, J.
September 1954
Aero Medical Lab., Wright-Patterson AFB, Ohio
WADC-TR-54-220, Project 7180
ASTIA AD-53,858

This bibliography lists by functional grouping the authors and titles of the reports published by the Psychology Branch, Aero Medical Laboratory, Directorate of Research, Wright Air Development Center, since its inception in 1945. Certain sections of the bibliography deal with perception.

550. A PROBABILITY MODEL FOR CORTICAL RESPONSES TO SUCCESSIVE AUDITORY CLICKS
Macy, J., Jr.
1954
Massachusetts Institute of Technology, Cambridge
Thesis

551. SERIAL CHARACTERISTICS OF NEURAL RESPONSES TO ACOUSTIC CLICKS RECORDED AT THE AUDITORY CORTEX
Harris, K. S.
1954
Harvard University, Cambridge, Mass.
Thesis.

552. CE QUI SUBSISTE DE LA THEORIE DE LA GESTALT DANS LA PSYCHOLOGIE CONTEMPORAINE DE L'INTELLIGENCE ET DE LA PERCEPTION (GESTALT THEORY EXISTING IN CONTEMPORARY PSYCHOLOGY OF INTELLIGENCE AND PERCEPTION)
Piaget, J.
Beihefte zur Schweizerischen Zeitschrift für Psychologie und ihre Anwendungen, v. 13, no. 24, pp. 72–83, 1954

Two principles of Gestalt theory are of fundamental significance; (1) those of equilibrium, and (2) those of totality. However, a distinction must be made in a theory of intelligence between nonadditive, irreversible totalities, which are true gestalten, and additive, reversible compounds with their specific laws of organization. Instances of the latter are lattice, group, and ring structures. Gestalt principles are applicable mainly in the pre-operational level when the child works out problems through configurations. Reversible structures occur after the age of seven years when the operational level is reached. As Révész has pointed out, Gestalt principles are inadequate in the explanation of perceptive activities of touch, to which the author adds vision. A possible way is indicated which may lead to a quantitative law in the gestalt explanation of elementary perception. (*PsyA*, 1955, #411)

553. CERTAIN ASPECTS OF VISUAL PERCEPTION
Yalan, E.
British Journal of Physiological Optics, v. 11, pp. 152–157, 1954
(See also *Ophthalmic Literature*, v. 8, no. 3, 1955)

554. A LEARNING THEORY PARADIGM FOR PERCEPTUAL VIGILANCE AND PERCEPTUAL DEFENSE PHENOMENA
Raskin, A. (University of Illinois, Urbana, 1954, Thesis)
Dissertation Abstracts, v. 14, p. 2130, 1954

555. L'EVOLUTION DU PROBLEME DE LA SENSATION AU XX^{e} SIECLE (THE PROBLEM OF SENSATION DURING THE 20TH CENTURY)
Pradines, M.
Journal de psychologie normale et pathologique, No. 47–51, pp. 43–68, 1954

Theories of sensation and perception from the beginning of the century to the present are outlined, from Bergson's notion of the adaptive character to Merleau-Ponty's existentialist discussion, with considerable emphasis on Gestalt theory and on the author's own experiments. 20 references. (*PsyA*, 1955, #6637)

556. INTERTRIAL ASSOCIATION AT THE VISUAL THRESHOLD AS A FUNCTION OF INTERTRIAL INTERVAL
Collier, G.
Journal of Experimental Psychology, v. 48, pp. 330–334, 1954

"Two kinds of intertrial association are possible. In the first, the shifts in the P_R are some function of a factor independent of the outcome of the preceding response or responses, while in the second, the shifts are some function of the preceding response or responses. The present experiment attempts to decide between these alternatives by determining the relationship between the amount of association and the intertrial interval. A positively accelerated, decreasing function was obtained. Several possible functions were inferred from the two alternative types of association . . . it was concluded that the intertrial association is a function of the outcome of the preceding trials, the effect decaying in time. (*PsyA*, 1955, #5223)

557. SOME INFORMATIONAL ASPECTS OF VISUAL PERCEPTION
Attneave, F.
***Psychological Review*, v. 61, pp. 183–193, 1954**

This is an attempt to apply the concepts and techniques of information theory to the problems of visual perception. The informational concept of redundancy comes in for a good deal of attention with regard to the understanding of phenomena of visual perception, and a demonstration of its nature in this area is presented. The analysis employed by the author also permits him to present informational and statistical descriptions of a good many classical concepts from the area of vision, including the historically most important Gestalt perceptual principles. (*PsyA*, 1955, #1960)

558. A DECISION-MAKING THEORY OF VISUAL DETECTION
Tanner, W. P., Jr. and Swets, J. A.
***Psychological Review*, v. 61, pp. 401–409, 1954**

559. COGNITIVE THEORY
Scheerer, M.
In "Handbook of Social Psychology,"
Lindzey, G., Editor
Addison-Wesley Publishing Co., Cambridge, Mass., 1954, Vol. I, pp. 91–142

Cognition is defined "as a centrally mediated process of representing external and internal events." Cognitive processes are analyzed, and the role of such factors in motivation, attitude, and emotion explored. Organizational versus Stimulus-Response orientations in cognitive theory are contrasted. Problem areas selected for illustrative discussion are molar-molecular, conation and cognition, cognitive development, and genetic reductionism. (*PsyA*, 1955, #3827)

560. A THEORY OF RECOGNITION
Tanner, W. P., Jr.
May 1955
University of Michigan, Engineering Research Institute, Ann Arbor
Technical Report 50, Report 2262-72-T,
DA 36-039-sc-63203
ASTIA AD-69,773

The theory of signal detection as applied to the human observer is reviewed. The theory is then extended to include the simple case of recognizing a signal as one of a set of two alternatives, and experiments relating to this case are reported. The principles upon which the theory can be extended to cover more complex alternatives are developed.

561. THEORY AND GENERAL PRINCIPLES OF OBSERVING SYSTEMS
Blasbalg, H.
October 1955
Johns Hopkins University, Radiation Lab., Baltimore, Md.
TR AF-25, AF 33(616)68
ASTIA AD-77,000

The fundamental physical and conceptually logical principles which characterize physical observations, and hence, automatic observing systems are discussed. The part played by the human observer in defining a physical observation relative to his *a priori* information state is clearly described. In the problem considered, the observer must define a set of measurable properties that can take on only two significant values. Thus, the result of a measurement is "yes," the property is present or "no," the property is not present. It is shown that systems of this nature have a learning capability in the sense that the information gained from the observation can be reflected back into the system as *a priori* information for the next observation. The part that is played by statistical decision theory in optimizing a physical observation is briefly dis-

cussed. A system having certain specific properties is considered in detail. Finally, a practical system based on these principles and designed at the Radiation Laboratory of Johns Hopkins University is briefly discussed.

562. ATTENTION AND MEMORY IN LISTENING TO SPEECH
Broadbent, D. E.
1955
Medical Research Council, Great Britain
ASTIA AD-73,358 (See also AD-22,165)

A discussion is presented of the following aspect of speech: When a stream of speech arrives at a particular listener on a particular occasion, in addition to sensory discrimination, perceptual analysis, and the recognition of familiar phonemes, certain functions appear which organize the material, produce understanding, and initiate an appropriate response. Experiments conducted by previous researchers are described. Three unpublished experiments concern (1) time needed for double shifts of attention; (2) combined visual and auditory presentation, and (3) listening between and during irrelevant signals.

563. RECOGNITION AND IDENTIFICATION OF COMPLEX VISUAL FORMS AS A FUNCTION OF THE LABELING SYSTEM EMPLOYED
Hake, H. W. and Eriksen, C. W.
1955
Wright Air Development Center, Wright-Patterson AFB, Ohio
WADC TR 55-367

The effect upon subsequent recognition skill of giving subjects practice in the use of irrelevant labels as discriminating responses before they learned to associate them with a set of unfamiliar stimulus forms was systematically studied and reported. The results suggest that labeling practice can (1) have the function of forcing subjects to differentiate a set of stimulus forms, and (2) can provide a denotative process whereby subjects organize and identify the stimulus aspects differentiated by practice. (*PsyA*, 1958, #2216)

564. PERCEPTION ET COGNITION (PERCEPTION AND COGNITION)
Michotte van den Berck, A.
***Acta Psychologica*, v. 11, pp. 70–91, 1955**

A theory of perception, and a report of experiments in perception and interpretation of discordant stimuli are presented. The perceptive event envisaged in all its complexity in an individual of some degree of development includes an element of personal acceptance, refusal, faith or doubt — an indispensable consideration in studying his behavior. 23 references. (*PsyA*, 1956, #2093)

565. "RATIOMORPHIC" MODELS OF PERCEPTION AND THINKING
Brunswik, E.
***Acta Psychologica*, v. 11, pp. 108–109, 1955**

566. THE RELATION OF PERCEIVED SIZE TO PERCEIVED DISTANCE: AN ANALYSIS OF GRUBER'S DATA
Gilinsky, A. S.
***American Journal of Psychology*, v. 68, pp. 476–480, 1955**

An analysis of Gruber's data (see *PsyA*, 1955, #6678) shows that they actually support, rather than deny, the hypothesis that perceived size is proportional to perceived distance. (*PsyA*, 1956, #3952)

567. LA PERCEPTION COMME PROCESSUS D'ADAPTATION: L'EVOLUTION DES RECHERCHES RECENTES (PERCEPTION AS A PROCESS OF ADAPTATION: THE EVOLUTION OF RECENT RESEARCH)
Fraisse, P.
***Année psychologique*, v. 53, pp. 443–461, 1955**

Perception is an integrative process. Extroceptive stimuli come in contact with proprioceptive and interoceptive stimuli, which act conjointly on a nervous system in which experience has left traces—a system which is in a state of sensitivity. The perceptual process inheres in a body of concepts and principles where they take their place, not by the side of, but in relation to the process of learning, of motivation and social influences. 48 references. (*PsyA*, 1954, #8397)

568. A THEORY OF SHAPE RECOGNITION
Deutsch, J. A.
***British Journal of Psychology*, v. 46, pp. 30–37, 1955**

Facts which a theory of shape recognition must account for include the "... ability to abstract form independent of place, inclination or size, equivalence of shape of mirror images and of squares and circles in some species, and

lastly the survival of these abilities following extensive lesions of the straite area." A theory of form recognition, complementary to the author's theory of motivation and learning, is suggested as meeting these requirements. "This mechanism is also seen to have further properties which ought to manifest themselves in behavior if the appropriate tests are made." Lastly various objections are discussed. Aspects of the mechanism are not entirely without neurophysiological plausibility. (*PsyA*, 1955, #6661)

569. THE RELATIVE ROLES OF INFORMATION AND ACTION IN THE GENESIS OF A PERCEPTION
Bagby, J. W., Jr. (Columbia University, N. Y., 1955, Thesis)
***Dissertation Abstracts*, v. 15, pp. 1269–1270, 1955**

570. INTERSENSORY TRANSFER IN FORM RECOGNITION
Gaydos, H. F. (University of Florida, Gainesville, 1953, Thesis)
***Dissertation Abstracts*, v. 15, pp. 2582–2583, 1955**

571. INDIVIDUAL DIFFERENCES IN ORIENTATION IN PERCEPTUAL AND COGNITIVE TASKS
Rabe, A.
***Canadian Journal of Psychology*, v. 9, pp. 149–154, 1955**

The consistency with which individual reactions of 41 university students were part- or whole-oriented was studied by means of the intercorrelations of five perceptual and cognitive tests: Circle Size Illusion, Gottschaldt Figures A and B, Minn. Paper Formboard, Mooney Closure Test, and Addition of Numbers Series. The more complex perceptual tests had the highest intercorrelations. What has been called "part-whole orientation" may be related to Thurstone's two factors of closure. (*PsyA*, 1956, #3923)

572. IMPLICATIONS OF THE PSYCHOLOGY OF PERCEPTION FOR WORD STUDY
Gates, A. I.
***Education*, v. 75, pp. 589–595, 1955**

The author shows how the recognition of printed words in the initial stages of reading is similar to many forms of perception studied in the psychological laboratories. Facts and principles which have been developed in the psychological studies of visual perception should also apply to the activities involved in word recognition. He states that experimental evidence proves that specific help is needed in learning to perceive effectively each and every kind of material. (*PsyA*, 1956, #8463)

573. PERCEPTION THEORY AND GENERAL SEMANTICS
Kilpatrick, F. P.
***ETC: A Review of General Semantics*, v. 12, pp. 257–264, 1955**

Perception is primarily a learned activity, insofar as it is communicable. Language is a social means for organizing perceptions in certain ways acceptable in a given culture. The perceptual process "can best be thought of as a transactional one." In opposition to certain traditional views, "it is proposed that for any stimulus configuration ... there is an indefinitely large class of environmental circumstances which could give rise to exactly the same set of impingement on the organism." In stress situations, the organism perceives stimuli as he learned to under nonstress conditions, even when this is inappropriate. In ambiguous or novel situations, when perception gives puzzling results, previous verbal-cognitive structures impose an order or identity on the stimuli so that they may be perceived in a controllable way. Research data bearing on these and other propositions are cited and discussed briefly. (*PsyA*, 1956, #6692)

574. SYMBOL UND WELTERFASSUNG (SYMBOL AND COGNITION)
Caruso, I. A.
***Jahrbuch für Psychologie und Psychotherpie*, v. 3, pp. 66–74, 1955**

Perception is the outcome of inner anticipations and outer stimulus demands, of projection and introjection. Like the dreamer and schizophrenic, the naive realist or rationalist fails to consider the participation of expectations in perception. The perceived symbol represents an encounter of the subjective and the objective, and though it may be more strongly determined from one or the other side, both sides are always involved. Symbols in physics represent one extreme, symbols in personality the other. (*PsyA*, 1956, #252)

575. "PERCEPTUAL DEFENSE" AS AN INTERFERENCE PHENOMENON

Hochberg, J. E., Haber, S. L., and Ryan, T. A.
***Perceptual and Motor Skills*, v. 5, pp. 15–17, 1955**

A tachistoscopic recognition threshold for 14 5-letter nonsense syllables was determined for 8 Ss in each of three groups. Then the effect of a buzzer on the recognition threshold of 7 syllables was determined for each S by comparing it with the recognition threshold for the remaining 7 syllables without buzzer. With Groups A and B but not C, the buzzer had been paired with shock, independently of the syllables. With Groups A and C, during the test period the buzzer preceded the exposure of the syllable by 0.5 sec, while with Group B, it followed it by 0.1 sec. Recognition of the "buzzer" syllables was poorer in the case of both Groups A and B, but not C. This was interpreted to mean that raised recognition thresholds for materials of "negative" stimulus value may simply be due to interference by competing disruptive responses. (*PsyA*, 1956, #2084)

576. PERCEPTUAL LEARNING: STIMULUS DIFFERENTIATION OR DIFFERENTIATING RESPONSE?

Mandler, G.
***Psychological Reports*, v. 1, pp. 79–82, 1955**

The Gibsons' position that "stimulus input contains within it everything that the percept has" is not operationally satisfactory. An approach in terms of differentiating responses is proposed, which posits response invariance and the inferred stimulus as basic concepts. A given stimulus situation, evoking *n* different responses in one individual, has not been fully discriminated by a second individual if he emits less than *n* different responses. (*PsyA*, 1959, #2382)

577. CONDITIONING AND PERCEPTION

Razran, G.
***Psychological Review*, v. 62, pp. 83–95, 1955**

A theoretical and empirical summary of the problems of relating conditioning and perception is presented. The discussion is built around four questions: (1) Do nonperceptual reactions become conditioned? (2) Do perceptual reactions become conditioned? (3) What is the course of conditioning when the relation between the two reactions, in addition to the perception of each reaction individually, is clearly perceived? (4) May mere conditioning give rise to new—and novel—perceptions? The major conclusion concerning the differences between perceptual and non-perceptual learning is that the division can best be obtained on the basis of the presence or absence of perceived relations between stimuli and reactions involved in learning. 64 references. (*PsyA*, 1955, #8396)

578. PERCEPTUAL LEARNING: DIFFERENTIATION OR ENRICHMENT?

Gibson, J. J. and Gibson, E. J.
***Psychological Review*, v. 62, pp. 32–41, 1955**
(See also *Americana*, v. 2, pp. 83–94, 1956)

The authors entertain the hypothesis that the flux of stimulation at receptors yields all of the information anyone needs about the environment. In the theory, perception gets richer in differential responses, not in images. It is progressively in greater correspondence with stimulation, not in less. Previous literature as well as an illustrative experiment are brought to bear upon the idea. (*PsyA*, 1955, #8374)

579. A STATISTICAL MODEL FOR THE PROCESS OF VISUAL RECOGNITION

Binder, A.
***Psychological Review*, v. 62, pp. 119–129, 1955**

A statistical model of the process of visual recognition has been presented. In the model, objects are assigned to classes on the basis of their attributes and classes are defined in terms of the common attributes possessed by their member objects. Objects in the same class have exactly the same set of attributes, while objects in different classes differ in regard to at least one attribute. The task involved in the model is the assignment of an object to a class on the basis of a known set of attributes. The available attributes determine the number of possible alternative classes to which the object may belong and, concomitantly, the statistical uncertainty of the object's class name. (*PsyA*, 1955, #8251)

580. THE FUNCTIONS OF SCHEMATA IN PERCEIVING

Vernon, M. D.
***Psychological Review*, v. 62, pp. 180–192, 1955**

Objections are made to excessive emphasis on the influence of transient individual needs and interests upon perception. Greater attention should be directed toward the influence of the more enduring forms of cognitive organization. Specifically, the usefulness of Bartlett's concept of the "schema," is pointed out and attempts are made to relate it to a good deal of perceptual data. 47 references. (*PsyA*, 1956, #270)

581. WHAT IS LEARNED IN PERCEPTUAL LEARNING? A REPLY TO PROFESSOR POSTMAN

Gibson, J. J. and Gibson, E. J.
***Psychological Review*, v. 62, pp. 447–450, 1955**

This is a reply to Professor Postman's critique (see *PsyA*, 1956, #5713) of the Gibsons' theory. The main point of disagreement concerns the authors' belief that Postman does not avoid the problems inherent in the associationistic position by ridding it of phenomenal experience and relating it to S-*R* connections. It is held that Postman's position leaves him with the problem of whether perceptual learning is a change in the attachment of responses to stimuli or an increase in the specificity of responses to stimuli. (*PsyA*, 1956, #5690)

582. THE PERCEPTION OF THREE-DIMENSIONAL SOLIDS

Langdon, J.
***Quarterly Journal of Experimental Psychology*, v. 7, pp. 133–146, 1955**

A specially constructed "solid" was "... made to undergo progressive physical changes of shape while being compared, under controlled conditions, with various stationary two-dimensional projections. . . . results indicate that . . . solids possess perceptual properties not shared by simple surfaces or representational projections . . . changes in the magnitude and sign of the constant errors obtained under certain conditions can be explained only on the assumption that subjects react to the stimulus in terms of some conceptual schema . . . involving mental processes other than those of perception." 17 references. (*PsyA*, 1956, #3965)

583. FISIOLOGIA Y PATOLOGIA DE LA PERCEPCION OPTICA DEL MOVIMIENTO (PHYSIOLOGY AND PATHOLOGY OF THE VISUAL PERCEPTION OF MOVEMENT)

Castilla del Pino, C.
***Revista de Psicologia General y Aplicada*, v. 10, pp. 49–122, 1955**

Part I presents a detailed discussion of the normal perception of movement, including the structure of the eye and receptors, the processes which take place in visual sensation, and the perception which results from these processes. Part II discusses the pathology in the perception of movement. In both parts, attention is directed toward two questions: To what functional level is it possible to attribute the perception of movement? What change in the process of perception takes place after lesion of a specific sector of the cortex? The following sequence is proposed for the order in which disturbances in perception take place: perception of any variation, perception of direction, perception of magnitude of displacement, and perception of the rate of speed. (*PsyA*, 1958, #1174)

584. THE EFFECT OF COLOR ON THE PERCEPTION OF SIZE

Sato, T.
***Tohoku Psychological Folia*, v. 14, pp. 115–129, 1955**

The hypothesis that the apparent size of identical surfaces varies with color is tested. Orange and yellow are overestimated, blues underestimated, red uncertain, greens and purples neither one nor the other, white seen larger than black. Brightness and quantity of overestimation yield a high correlation. The essential factor in perception is, therefore, brightness, while contrast, definition, etc., are contributing factors. French and German summaries. (*PsyA*, 1956, #375)

585. VYSSHAIA NERVNAIA DEIATELNOSTI I PROBLEMA VOSPRIIATIIA (HIGHER NERVOUS ACTIVITY AND THE PROBLEM OF PERCEPTION)

Sokolov, E. N.
***Voprosy Psikhologii*, v. 1, no. 1, pp. 58–65, 1955**
(Abstracted in *Acta Psychologica*, v. 11, pp. 134–135, 1955)

586. DIE AUFFASSUNG PAWLOW'S UND BYKOW'S VON DEN BEZIEHUNGEN DES ORGANISMUS ZUR UMWELT UND FRAGEN DER NEUEREN WAHRNEHMUNGSPSYCHOLOGIE (THE ASSUMPTIONS OF PAVLOV AND BYKOV CONCERNING THE RELATIONSHIP OF THE ORGANISM TO THE ENVIRONMENT, AND PROBLEMS OF THE NEWER PSYCHOLOGY OF PERCEPTION)
Klix, F.
***Zeitschrift für Psychologie*, v. 158, pp. 1–39, 1955**

Those neurodynamic regulatory mechanisms must be regarded as phylogenetically formed adaptive mechanisms which correspond to the peculiarities of figural perception, changes in after-image, contrast phenomena, etc. However, these mechanisms are not fixed or autonomous regulators, but are codetermined by the actual or habitual perceptual attitudes of the observer in relation to the object perceived. A series of investigations make it obvious that these peculiarities have a physiological equivalent in the frontal and occipital lobes. Using spatial perception as an example this dialectic causal relationship tends to explain a series of hitherto independently explained phenomena. It seems as if, psychologically seen, viewing perception as a mechanistic function would be more suitable for comprehension of the many newer investigations. 108 references. (*PsyA*, 1958, #1160)

587. THEORIES OF PERCEPTION AND THE CONCEPT OF STRUCTURE: A REVIEW AND CRITICAL ANALYSIS WITH AN INTRODUCTION TO A DYNAMIC–STRUCTURAL THEORY OF BEHAVIOR
Allport, F. H.
John Wiley & Sons, Inc., New York, N. Y., 1955

"This book represents an effort to survey carefully the contributions that modern psychologists have made to the theory of perception . . ." Following three introductory chapters dealing with the role of theories in psychology and the problems and phenomena of perception, 16 chapters are devoted to a descriptive, interpretative, evaluative and integrated review of nine types of perceptual theory: classical, configurational, field, association, motor, adaptation level, transactional functionalism, directive state, and cybernetic. The problem of meaning is considered in one chapter with the demonstration that none of the theories deals with it adequately. Following a summary chapter the author presents in the final chapter an outline of his general theory of event-structure with its application to perceptual problems. 285-item bibliography. (*PsyA*, 1955, #5067)

588. CURRENT THEORETICAL APPROACHES TO PERCEPTION
Bakan, P.
In "Present-Day Psychology," Roback, A. A., Editor
Philosophical Library, New York, N. Y., 1955, pp. 57–75

An account is given of contemporary theoretical trends in the field of perception. It is argued that the discrepant theories noted are a function of the beliefs entertained by the investigator as to what constitutes events requiring explanation, and what he regards as stimulus and what as response. 44 references. (*PsyA*, 1956, #2073)

589. MULTIPLE-PROBABILITY LEARNING; AN INQUIRY INTO THE ORIGINS OF PERCEPTION
Smedslund, J.
Akademisk, Oslo, 1955

Perceptions are assumed to be established by a process of multiple-probability learning; i.e., by a process of learning to utilize complex configurations of ambiguous or probabilistic cues. Two experiments are described. The first was an attempt to study the process of multiple-probability learning. The Ss were college students. The second explored the possibility of utilizing some probability-learning procedure as a diagnostic tool in clinical psychology. The Ss were 13- and 14-year-old children. It was concluded that the existence of multiple-probability learning was demonstrated, that the learning process was slow and inefficient, and that there were large individual differences in the speed and amount of learning. (*PsyA*, 1958, #247)

590. RECEPTORS AND SENSORY PERCEPTION
Granit, R.
Yale University Press, New Haven, Conn., 1955

591. MEASUREMENT OF PERCEPTUAL PHENOMENA BY EKMAN AND JOHANNSON
Cronbach, L.
April 5, 1956
Office of Naval Research, London
Technical Report ONRL-28-56
ASTIA AD-99,977

592. DETECTION THEORY AND PSYCHOPHYSICS
Marill, T.
October 30, 1956
Massachusetts Institute of Technology, Research Laboratory of Electronics, Cambridge
TR 319

Study of traditional psychophysical models and W. P. Tanner and J. A. Swets' model; weaknesses of models are found eliminable by analysis in terms of detection theory; psychophysical methods are re-examined, and two-category forced-choice technique is found to be particularly advantageous; experiments using forced choice method with auditory signals masked by broad-band gaussian noise are reported. 25 references. (*EI*, 1957)

593. ON THE PSYCHOPHYSICAL LAW
Stevens, S. S.
November 2, 1956
Harvard University, Psycho-Acoustic Lab., Cambridge, Mass.
Report PNR-188, Nonr-186615
ASTIA AD-149,009

Two general classes of perceptual continua can be distinguished by means of four functional criteria. On Class I or "quantitative" continua the j. n. d. increases in subjective size as psychological magnitude increases, category rating-scales are concave downward when plotted against psychological magnitude, comparative judgments exhibit a time-order error (a "category effect"), and equisection experiments exhibit hysteresis. On Class II or "qualitative" continua these four effects are apparently absent. Class I, called prothetic, includes those continua on which discrimination is mediated by an additive mechanism at the physiological level; Class II, called metathetic, includes those mediated by a substitutive mechanism.

594. PERCEPTION OF PERSONS: REPORT OF THE INTER-UNIVERSITY SUMMER RESEARCH SEMINAR HELD AT HARVARD UNIVERSITY JUNE 21–AUGUST 12, 1955
1956
Social Science Research Council, New York, N. Y.
ASTIA AD-112,963

595. THRESHOLD-LUMINANCE FOR RECOGNITION IN RELATION TO FREQUENCY OF PRIOR EXPOSURE
Baker, K. E. and Feldman, H.
***American Journal of Psychology*, v. 69, pp. 278–280, 1956**

Each of 10 nonsense-words was exposed 1, 2, 5, 10, or 25 times to 12 Ss, and recognition-thresholds were then measured in terms of the minimal luminance-level required for correct identification. Threshold-luminance, like threshold-duration, is a function of familiarity, but there seems to be differences in the two functions. (*PsyA*, 1957, #5656)

596. A QUANTITATIVE INDEX OF STIMULUS-SIMILARITY PROXIMITY VS. DIFFERENCES IN BRIGHTNESS
Hochberg, J. and Silverstein, A.
***American Journal of Psychology*, v. 69, pp. 456–458, 1956**

A device by which the "operational indexing of similarity" in perceptual studies may be accomplished is described and illustrated. (*PsyA*, 1957, #7128)

597. FENOMENOLOGIA DELLA PERCEZIONE VISIVA TRIDIMENSIONALE IN RAPPORTO CON LA "TRANSACTIONAL THEORY" (PHENOMENOLOGY OF VISUAL TRIDIMENSIONAL PERCEPTION IN RELATION TO THE "TRANSACTIONAL THEORY")
Costa, A. M.
***Archivio di Psicologia, Neurologia y Psichiatria*, v. 17, pp. 905–931, 1956**

This is the first part of a study on perception to be completed at a later date. A critical analysis of the theoretical presuppositions and methodological approaches of the transactional theory of perception is presented in detail. It is stated that both the Gestalt theory and the

transactional theory go beyond psychology and, moreover, are related to phenomenology. For the Gestalt theory the experience is essentially discovery, while for the transactionist theory, it is rather construction. Transactional theory takes its epistemological and theoretical presuppositions from Dewey and Bentley. Characteristic similarities and differences with Gestalt theory are also analyzed. Reference to personal experimental work already published, or to be published, is also made. Italian, French, English, and German summaries are given. (*PsyA*, 1957, #7098)

598. SOME REFLECTIONS ON THE ANALYSIS OF PERCEPTION
Baxter, C. E.
***Bulletin of the Maritime Psychological Association*, v. 5, pp. 21–31, 1956**

Modern perceptual theory still accepts the Lockean distinctions between mind and external objects, and between perception and other mental processes, so that stimuli are identified in terms of themselves, neural systems seem self-evident, and perceptions are taken as mental structures which combine with memory and other processes. But in order to be understood properly, perception must be placed within the "life unity" of the person. All factors needed for its description can be found within it. (*PsyA*, 1959, #2715)

599. A CONFLICT INTERPRETATION OF CERTAIN PERCEPTUAL DYNAMICS
Michael, A. L. (University of Illinois, Urbana, 1955, Thesis)
***Dissertation Abstracts*, v. 16, p. 375, 1956**

600. THE EFFECTS OF DELAY OF INFORMATION FEEDBACK AND TASK COMPLEXITY ON THE IDENTIFICATION OF CONCEPTS
Bourne, L. E., Jr. (University of Wisconsin, Madison, 1956, Thesis)
***Dissertation Abstracts*, v. 16, pp. 2534–2535, 1956**

601. ROLE DES DONNEES PERCEPTIVES DANS L'ABSTRACTION (ROLE OF PERCEPTUAL DATA IN ABSTRACTION)
Vincent, M.
***Enfance*, v. 9, pp. 1–20, 1956**

602. THE THIRTIETH MAUDSLEY LECTURE: PERCEPTION AND IMPERCEPTION
Brain, W. R.
***Journal of Mental Science*, v. 102, pp. 221–232, 1956**

The philosophy of perception is important for the understanding not only of the anatomy of perceptual disorders, but also of art as the representation of feeling, of knowledge of the body, and of the relevance of hallucinations. The perceptual world is not identical with the physical world, but is a representation of it. The perceptual world is a construction of the brain of each individual and is private to him; moreover it incorporates sensory experience derived from the subject's body. 16 references. (*PsyA*, 1957, #5465)

603. THE QUANTITATIVE STUDY OF SHAPE AND PATTERN PERCEPTION
Attneave, F. and Arnoult, M. D.
***Psychological Bulletin*, v. 53, pp. 452–471, 1956**

604. DYNAMIC SYSTEMS, PERCEPTUAL DIFFERENTIATION, AND INTELLIGENCE
Livson, N. and Krech, D.
***Journal of Personality*, v. 25, pp. 46–58, 1956**

Responses to Wechsler's vocabulary subtest served as a specific cognitive performance and reproduction of 40 tachistoscopically presented dot patterns and ranking these patterns as to orderliness or difficulty constituted a perceptual task. Measures of these performances were rather highly correlated. This correlation was predicted on the basis of a deduction from a set of postulates defining the relationship between cortical conductivity and dynamic systems. (*PsyA*, 1957, #7945)

605. "FUNCTIONALISM" IN PERCEPTION
Prentice, W. C. H.
***Psychological Review*, v. 63, pp. 29–38, 1956**

Logical, experimental, methodological, and theoretical problems in the way of straightforward studies of the phenomena of perception are discussed, with special emphasis on the issues posed by the functionalist views of Bruner and Postman. 32 references. (*PsyA*, 1957, #2218)

606. APPLICATION OF THE STATISTICAL THEORY TO FORM PERCEPTION

Day, R. H.

***Psychological Review*, v. 63, pp. 139–148, 1956**

The arguments presented here are tentative, and in many respects speculative, yet they offer a consistent theory of form perception as an alternative to the diffusion hypothesis, which lacks neurophysiological foundation. The theory from which these arguments have been derived, although itself speculative to a certain degree, is based firmly upon neurophysiological and anatomical facts. It also has the less important but nevertheless relevant commendation that it has proved fruitful in dealing with other aspects of visual form perception. For the purposes of clear and detailed exposition, this paper has been confined largely to the treatment of form perception at low levels of illumination, with increasing contrast between figure and ground. 27 references. (*PsyA*, 1957, #2241)

607. OPERATIONISM AND THE CONCEPT OF PERCEPTION

Garner, W. R., Hoke, H. W., and Eriksen, C. W.

***Psychological Review*, v. 63, pp. 149–159, 1956**

Perception is conceived as a process intervening between stimuli and responses. As such it can be viewed as a concept whose properties may be delimited by converging operations. Converging operations are any set of experimental operations which eliminate alternative hypotheses and which can lead to a concept which is not uniquely identified with any of the original operations, but is defined by the results of all operations performed. . . . Illustrations from current experimental problems in perception indicate how some response characteristics may be isolated from perceptual properties, and vice versa. (*PsyA*, 1957, #4138)

608. INFORMATION-RECEIVING BEHAVIOR OF MAN

Toda, M.

***Psychological Review*, v. 63, pp. 204–212, 1956**

Communication theory as developed mainly for engineering purposes is incomplete as a theory of actual human communication. The required theory should pay proper attention to the following facts: (1) Human communication is a kind of game, sometimes cooperative and sometimes competitive. (2) The receiver's rules of decoding are usually not given; they should be developed by the receiver himself for each different information source. (3) The receiver may extract more than one information content from a signal. (4) The receiver is usually not given objective probabilities, but he estimates them. Accordingly, the amount of information and information content should be defined with respect to subjective probabilities. Particular attention should be paid to the problem of information synthesis. (*PsyA*, 1957, #4633)

609. AN EXAMINATION OF ONE ASPECT OF THE THESIS THAT PERCEIVING IS LEARNED

Pastore, N.

***Psychological Review*, v. 63, pp. 309–316, 1956**

Of the three of several possible meanings that could be ascribed to an empiristic approach to perception, the one which involves an initially random perceptual process in relation to a given stimulus was selected for intensive analysis. In order to enable the analysis to move forward, an initial fortuitous relationship was assumed between a perceptual process and the ensuing motor response. In general, the plan of the argument was to demonstrate that the assumptions of initial perceptual and motor random processes were incompatible with the fact of learned adaptive behaviors. The main effect of the argument, if valid, is to restrict further discussion of the thesis that "perceiving is learned" to the other meanings presented, or to some other meaning compatible with these two. (*PsyA*, 1957, #7070)

610. PERCEPTION: IDENTIFICATION AND INSTRUMENTAL ACTIVITY

Kanfer, F. H.

***Psychological Review*, v. 63, pp. 317–329, 1956**

The present paper suggests a conceptualization of the perceptual process which distinguishes two distinct phases in perception: (1) an initial response related to some dimensional pattern in the environmental stimulation; and (2) an instrumental response which is contingent upon the former. This formulation is presented primarily with the intent of ordering available data on perceptual processes, and suggesting further areas of research which would systematically evaluate the effect of various variables on the components of the complex perceptual process. In discussing the implications of the formulation, it

was indicated what meaningful questions could be raised on the basis of the view which is presented here. 26 references. (*PsyA*, 1957, #7064)

611. PERCEPTION AS SUBSTITUTE TRIAL AND ERROR

Campbell, D. T.
***Psychological Review*, v. 63, pp. 330–342, 1956**

A formal parallel is noted between some of the characteristics of organic evolution and trial and error learning. It is also pointed out that the execution of well-learned habits shares the same common features of providing organismic fit to the environment as learning and evolution, except for the apparent absence of the random variation feature. An attempt is made to account for this lack of correspondence by characterizing perceptual processes as substitute trial and error containing a search component which takes the place of blind overt motor responses. 39 references. (*PsyA*, 1957, #7055)

612. PATTERN RECOGNITION AND LEARNING

Selfridge, O. G.
Proceedings of the Third Symposium on Information Theory, Royal Institution, London, September 12–16, 1955
In "Information Theory," Cherry, C., Editor
Academic Press, New York, N. Y., 1956, pp. 345–353

Learning, pattern recognition, problem solving, chess playing are considered in terms of the type of computer program necessary to carry out such activities.

613. TEMPORAL AND SPATIAL PATTERNS IN A CONDITIONAL PROBABILITY MACHINE

Uttley, A. M.
In "Automata Studies," C. E. Shannon and J. McCarthy, Editors
Princeton University Press, N. J., 1956

614. VARSEBLIVNINGENS PSYKOLOGI (THE PSYCHOLOGY OF PERCEPTION)

von Fieandt, K.
Söderströms, Helsingfors, 1956

A revision of the author's earlier text on perception translated from Finnish into Swedish. Written primarily for university students, the book covers topics in perception in a systematic fashion within a Gestalt-phenomenological framework. 254 references. (*PsyA*, 1957, #7078)

615. ITALIAN PSYCHOPHYSIOLOGY AND EXPERIMENTAL PSYCHOLOGY, 1957

Geldard, F. A.
July 9, 1957
Office of Naval Research, London
Technical Report ONRL-80-57
ASTIA AD-137,708

Current research in four Italian laboratories of psychophysiology and experimental psychology is described: Florence—the graded luminance and Mach band studies, and the shaped light pulse and flicker work being done under the direction of Toraldo di Francia at the Institute of Optics; Bologna—a range of psychological studies conducted by Canestrari and his associates; Padua—researches, chiefly on visual perception, carried out by Metelli and his students; Milan—Margaria's and Gualtierotti's neurophysiological work on the effects of stress producing conditions on spinal reflexes, and some novel labyrinthine phenomena.

616. STIMULUS CORRELATES OF VISUAL PATTERN RECOGNITION—A PROBABILITY APPROACH

Fitts, P. M. and Leonard, A. J.
October 1957
Ohio State University, Research Foundation, Columbus
Final Report, Nonr-495(02)
ASTIA AD-150,641

A statistical methodology which permits objective specification of many of the objective properties of visual patterns is outlined. Experimental results indicated that, under noise-free conditions, redundancy was of little or no value and may, in some cases, be harmful. The only beneficial effect of redundancy in the case of noise-free figures was a small superiority of bilaterally symmetrical figures over asymmetrical figures. Certain types of redundancy (such as complete replication of a figure contour) were found to be beneficial in the presence of noise, i.e., when subject's task was to identify distorted patterns. The findings regarding complexity were consistent with the gen-

eral hypothesis that in many instances, such as speeded identification tasks, subjects do not process all of the information in a figure, but only the minimum amount required by the task. Findings also indicated that vertically oriented figures have, on the average, been identified more rapidly than horizontally oriented figures. Studies on the effects of achievement information feedback in a perceptual task revealed that training efficiency can be increased, and a perceptual learning task made more interesting, by the use of visual and auditory display devices that provide quantized knowledge of achievement information, relative to some standard.

617. CONCEPT FORMATION AS A FUNCTION OF COMPETITION BETWEEN RESPONSE PRODUCED CUES

Kendler, H. H. and Karasik, A. D.
November 15, 1957
New York University, N. Y.
Technical Report 1 on Studies on the Experimental Analysis of Problem Solving Behavior
Nonr-28530
ASTIA AD-147,130

A mediational *S-R* formulation was applied to verbal concept formation behavior. It was hypothesized that concept formation depended not only on S responding to words that belong to a concept (relevant words) with a common implicit response, but also S responding to the words that do not belong (irrelevant words) with different implicit responses. It was predicted, therefore, that different sets of irrelevant words should influence the manner in which a set of relevant words are combined into a common concept. This prediction was confirmed. The results suggested that the speed of concept formation varied directly with the ability of the irrelevant words to evoke implicit responses that are distinctively different from those required for the relevant words.

618. FACTORS AFFECTING SIGNALING BY VISUAL METHODS

Dwiggins, R. D.
December 10, 1957
Naval Ordnance Lab., White Oak, Md.
NAVORD 6034
ASTIA AD-162,931

The use of visual methods to convey information over relatively large distances has long been practiced. The effectiveness of signaling by these methods depends, fundamentally, upon: (1) the physical nature of the signal, (2) the transparency of the atmosphere, (3) the ambient illumination, and (4) the physiological and psychological response involved in seeing. These broad factors are analyzed and discussed in terms of their individual components. This information is presented on the following topics: (1) characteristics of the eye and the seeing process, (2) the effect of brightness contrast on visibility thresholds, (3) luminance thresholds for various colors, (4) relative effectiveness of point sources over diffuse light, (5) values of background luminance under various natural conditions, and (6) the relative effectiveness of a flashing light versus a steady light as a signal.

619. SIGNAL DETECTION WITH SIMULTANEOUS VISUAL AND AUDITORY PRESENTATION

Loveless, N. E.
December 1957
Flying Personnel Research Committee, Great Britain
FPRC-1027
ASTIA AD-201,167

A comparison was made of the rate of detection of noise-masked signals with audio, visual, and audio-visual presentation. It was found that the bi-sensory presentation yielded a detection rate consistently higher than that obtained with the better uni-sensory display. Some subjects succeeded in achieving theoretically optimal performance with the bi-sensory display; that is, the probability of missing a signal was equal to the product of the probabilities of missing signals on the auditory and visual displays individually. Other subjects, however, failed to reach this criterion, either through difficulty in attending to two displays simultaneously or through adoption of an inferior strategy of decision. It was concluded that an increase in the number of sensory channels employed is capable of facilitating the detection of near-threshold signals, but that specific training in the use of such a display is probably desirable.

620. A RE-EVALUATION OF TRADITIONAL CUES FOR DISTANCE (AND) PROBLEMS OF APPLICATION IN DISTANCE PERCEPTION

Smith, P. C., Smith, O. W., and Hochberg, J. E.
December 1957
Cornell University, Ithaca, N. Y.
Nonr-40,114
ASTIA AD-153,267

An analysis is made of certain relatively untouched problems of distance perception. Two specific programs are suggested. The first involves establishing usable tables of stimulus-judgment relationships. The second consists of specifying effective visual inputs, as well as the populations for which they can be expected to be effective. The completion of these programs depends upon a formidable array of methodological requirements—multivariate experiments with large Ns with usable and useful criteria of judged distance, and with clear separation of errors attributable to discrimination, identification, motor coordination, and knowledge of the performance characteristics of the instrument of response. These requirements may seem prohibitively stringent, but (a) they will amply pay for themselves, and (b) they appear to provide the only solid path to a generally scientific theory (or theories) of visual distance perception.

621. FORM DISCRIMINATION AS RELATED TO MILITARY PROBLEMS
Proceedings of a Symposium Sponsored by the Armed Forces-NRC Committee on Vision at Tufts University, Medford, Mass., April 4 and 5, 1957
Wulfeck, J. W. and Taylor, J. H., Editors
National Academy of Sciences,
Washington, D. C.
Publication 561
ASTIA AD-160,512

The following aspects of form discrimination are discussed: the significance of form discrimination in military applications, in visual psychophysics, and in psychology; techniques for investigating form discrimination (stimulus generation, apparatus and procedure, and data analysis); the relation of form to visual detection; and form discrimination in problems of recognition and identification.

622. FORM PERCEPTION AND SENSORY PROCESSES
Graham, C. H.
1957
Columbia University, New York, N. Y.
National Academy of Sciences, Washington, D. C.
Publication 561
ASTIA AD-200,696

623. CONTEMPORARY APPROACHES TO COGNITION.—A REPORT OF A SYMPOSIUM AT THE UNIVERSITY OF COLORADO, MAY 12–14, 1955
Bruner, J. S., Brunswik, E., Festinger, L., Heider, F., Muenzinger, K. F., Osgood, C. E., and Rapaport, D.
Harvard University Press, Cambridge, Mass., 1957

Karl F. Muenzinger gives the introduction, and Egon Brunswik presents a discussion of the "Scope and Aspects of the Cognitive Problem," emphasizing the ecological phase. Jerome Bruner discusses "Going Beyond the Information Given"; Charles E. Osgood provides "A Behavioristic Analysis of Perception and Language as Cognitive Phenomena"; Leon Festinger offers a hypothesis on "The Relation Between Behavior and Cognition"; and David Rapaport relates cognition to personality in terms of "Cognitive Structure." Each of the above papers is followed by a discussion by one of the participants. Fritz Heider summarizes and critically reviews the contributions to the symposium. (*PsyA*, 1959, #1258)

624. CONTRIBUTIONS OF PSYCHOLOGY TO THE STUDY OF PATTERN VISION
Hake, H. W.
1957
Wright Air Development Center, Wright-Patterson AFB, Ohio
Technical Report 57-621

A survey is provided of major research topics in psychology having relevance to patterned vision including the study of threshold measurements, visual distortion, form discrimination, constancy in form perception, memory for form, and training problems. In addition to a review of the research, the author has attempted to organize the results in terms of a few major trends. 332 item bibliography. (*PsyA*, 1959, #5348)

625. EL ANALIZADOR PERIFERICO Y LA TEORIA DE LA ESTRUCTURA (PERIPHERAL ANALYZERS AND THE THEORY OF STRUCTURE)
Thénon, J.
***Acta Neuropsiquíatrica Argentina*, v. 3, pp. 1–9, 1957**

"Perception of an object involves all the functions of the eye—extero-, intero-, and proprioceptive. Sensation and perception are the results of total activity about the object, not Lockean merely passive reception. Visual

sensation and optical recognition of an object arise from the retinal analyzers . . . from each one and from the totality of these analyzers which integrate vision, the cortex extracts, by means of its double functions of analysis and synthesis, the elements of representation and imagination. The explanation of certain forms and illusions is in the central nervous system's analytical and synthetic functions and mechanisms. Not only the "meanings" given by Gestalt theorists, but also their assumptions of *a priori* "configurations," are "erroneous and unnecessary." (*PsyA*, 1959, #4976)

626. DIE MITBERUCKSICHTIGUNG DES SUBJECTS IM SINNESPHYSIOLOGISCHEN MESSAKT (CONSIDERATION OF THE SUBJECT IN PSYCHOPHYSIOLOGIC MEASUREMENTS)
Bergström, R. M.
***Acta Physiologica Scandinavica*, v. 41, Supplement No. 144, 1957**

A conceptual model of perceiving is sought where the S need not be sacrificed to "objectivity." The "central-nervous-system/environment" model is replaced by "experience/space-time" formulae, such as $E \rightarrow t^n \cdot k$ ($\rightarrow v^n \cdot m$). Rolling balls, hitting the finger tip, produced "monopolar" equality experiences in about ½ of the persons, i.e., equality was experienced either when mv, or mv^2 (majority of the Ss), or mv^3 were equal. Others were either distinctly or diffusely "polypolar," having two or three equality points. (*PsyA*, 1959, #5264)

627. BRUNSWIK'S THEORY OF PERCEPTION: A NOTE ON ITS APPLICABILITY TO NORMAL AND NEUROTIC PERSONALITY FUNCTIONING
Imboden, J. B.
***A.M.A. Archives of Neurology and Psychiatry*, v. 77, pp. 187–192, 1957**

Brunswik's probabilistic-functional theory is first described. It is then proposed that this theory has broad applicability to the study of personality development, both normal and neurotic. By extension of the theory it is posited than "an experientially determined, unconsciously assumptive, perceptual component underlies the emotional and attitudinal characteristics of both normal and neurotic behavior." This is illustrated by reference to Freud's repetition compulsion and to problems of transference in psychoanalysis. (*PsyA*, 1959, #1158)

628. PERCEPTION: EQUIVALENCE, AVOIDANCE, AND INTRUSION IN SCHIZOPHRENIA
Scher, J. M.
***A.M.A. Archives of Neurology and Psychiatry*, v. 77, pp. 210–217, 1957**

The nature of perceptual activities, both normal and psychopathological, is described and discussed with particular reference given to the role of therapist in treatment of the schizophrenic patient. 33 references. (*PsyA*, 1959, #1866)

629. MECANISMES NEUROLOGIQUES DANS LA PERCEPTION (NEUROLOGICAL MECHANISMS IN PERCEPTION)
Bruner, J. S.
***Archives de Psychologie, Genéve*, v. 36, pp. 1–28, 1957**

The author discusses the contributions of neurophysiology to our understanding of how perception represents the structure of the physical environment which makes up the stimulus, the perceptual constancies, and the phenomena of variations in perception while the stimulus remains constant. 56-item bibliography. (*PsyA*, 1959, #2633)

630. O METODE OPREDELENIIA DIFFERENTSIALNOI CHUVSTVITELNOSTI V USLOVIIAKH RAZLICHENIIA RIADA SIGNALOV (ON THE METHOD OF DETERMINING DIFFERENTIAL SENSITIVITY UNDER CONDITIONS OF DISTINGUISHING A SERIES OF SIGNALS)
Chistovich, L. A. and Voitinskiĭ, E. Ia.
***Biofizika*, v. 2, pp. 142–146, 1957**

The feasibility is demonstrated of utilizing logical models in the study of certain variational regularities in the differentiating capacity of man. (*PsyA*, 1958, #3595)

631. COGNITIVE INFERENCE IN PERCEPTUAL ACTIVITY
Vernon, M. D.
***British Journal of Psychology*, v. 48, pp. 35–47, 1957**

Whenever the sensory data are scanty or ambiguous, or incongruities occur in the perceptual situation, observers

tend to employ processes of inferential thinking to arrive at satisfactory identifications. In making inferences, observers utilize schematically organized knowledge and tendencies to react which they have acquired, either through experiences which are common to everyone as they grow up, or as the result of particular individual experiences and training. Evidence supporting this thesis is given in examples drawn from everyday life and from experimental investigations. 30 references. (*PsyA*, 1958, #3897)

632. IS A THEORY OF PERCEPTION POSSIBLE?
Hamlyn, D.
***Bulletin of the British Psychological Society*, v. 31, pp. 47–48, 1957**

633. PERCEPTUAL STRUCTURING OF SEQUENCES OF STATISTICALLY DEPENDENT EVENTS
Williams, L. G. (University of Michigan, Ann Arbor, 1956, Thesis)
***Dissertation Abstracts*, v. 17, pp. 1397–1398, 1957**

634. NEURAL INTERACTION AND PERCEPTUAL AWARENESS: EXPLORATORY EXPERIMENTS
Irvine, R. P. (Stanford University, Calif., 1957, Thesis)
***Dissertation Abstracts*, v. 17, pp. 2688–2689, 1957**

635. FACTORS CONTRIBUTING TO GENERAL VERSUS SPECIFIC PERCEPTUAL LEARNING
Leonard, J. A., et al.
***Journal of Experimental Psychology*, v. 33, pp. 324–329, 1957**

636. DYNAMIC CONTOUR PERCEPTION
Smith, W. M. and Gulick, W. L.
***Journal of Experimental Psychology*, v. 53, pp. 145–152, 1957**

The perception of contour of a moving stimulus was studied in relation to how long the stimulus was seen before or after it moved, or both. The results were interpreted on the basis of the statistical theory of perceptual processes. (*PsyA*, 1958, #1205)

637. THE STATISTICAL DETECTION OF THRESHOLD SIGNALS IN THE RETINA
FitzHugh, R.
***Journal of General Physiology*, v. 40, pp. 925–948, 1957**

Photographic records of impulses from single ganglion cells in the cat's retina were made while the retina was stimulated by flashes occurring once a second. The data were analyzed by methods growing out of information theory, and the results appear to provide a physical interpretation of a previously reported statistical model of the visual process. (*PsyA*, 1959, #2832)

638. MULTIDIMENSIONAL PSYCHOPHYSICS: A METHOD FOR PERCEPTUAL ANALYSIS
Andrews, T. G. and Ray, W. S.
***Journal of Psychology*, v. 44, pp. 133–144, 1957**

Traditional psychophysics assumed a single dimension judgment, dictated by the experimenter. However, there are numerous possible instructions, attributes, associations, dimensions, or clusters. Thirty-one preceding studies are reviewed from a standpoint of these dimensions, most of them approached by factor analysis. (*PsyA*, 1959, #7432)

639. TRAINING IN PERCEPTUAL SKILLS
Allan, M. D.
***Occupational Psychology*, v. 31, pp. 113–119, 1957**

Recent views about the nature of perception are related to the learning of recognition skills. The view is expressed that perception is a function of experience, and therefore is a learned process. (*PsyA*, 1959, #270)

640. THE ROLE OF VISION IN CHILD GROWTH
Curran, J. J.
***Optometric Weekly*, v. 48, pp. 2161–2163, 1957**

A general discussion of the functional approach to visual problems in children. 16 references. (*PsyA*, 1959, #368)

641. AFFECTIVE PROCESSES IN PERCEPTION
Jenkin, N.
***Psychological Bulletin*, v. 54, pp. 100–127, 1957**

The studies reported in this paper are classified into four general areas: (1) studies of size judgment; (2) studies of the relationships between physiological needs and perception; (3) studies on "selective sensitization" to positively valued stimuli; and (4) studies concerned with "perceptual defense." A section is also included on the various ways of defining the term perception. The author concludes that a need exists for further research, replication of existing studies, improved methodology, and a greater concern for theoretical objectives. 129-item bibliography. (*PsyA*, 1958, #2425)

642. A REAPPRAISAL OF THE ROLES OF PAST EXPERIENCE AND INNATE ORGANIZING PROCESSES IN VISUAL PERCEPTION

Zuckerman, C. B. and Rock, I.
***Psychological Bulletin*, v. 54, pp. 269–296, 1957**

This paper is an attempt to evaluate the controversy existing between those theories which emphasize the role of learning on perception and the theory which emphasizes the role of innate organizing processes on perception. The writers conclude "that various aspects of the phenomenal world and, in particular, the segregation and shape of visual forms are given by innate organizing processes. Percepts may be modified and enriched by experimental factors but the effects of such factors presuppose the prior existence of visual forms." 82 references. (*PsyA*, 1959, #2811)

643. A LANGUAGE FOR PERCEPTUAL ANALYSIS

George, F. H. and Handlon, J. H.
***Psychological Review*, v. 64, pp. 14–25, 1957**

The aim of this paper is to develop further the theory of behavior that has already been outlined by the authors in a previous publication. In particular, it aims to develop that part of the total theory which deals with perception and to clarify what has sometimes been called the "nativist-empiricist controversy." The method adopted in presenting the over-all theory is to proceed by degrees toward a state of greater precision by selecting for elaboration at each stage some single aspect of the whole theory. It is at present a skeleton theory, where an attempt is made to lay down a language to deal with the principal problems of behavior. The aim is as much metatheoretical as theoretical, and involves the clarification of existing terminology as well as the laying down, albeit tentatively, of rules for the use of such terminology. (*PsyA*, 1958, #15)

644. THE PHYSIOLOGICAL BASIS OF FORM PERCEPTION IN THE PERIPHERAL RETINA

Day, R. H.
***Psychological Review*, v. 64, pp. 38–48, 1957**

A theory of form perception in the peripheral retina, based upon the statistical theory of neurophysiological activity in the visual primary projection system, has been presented. . . . Data drawn from various sources have been examined and interpreted as evidence for the theoretical proposals. These data include qualitative aspects of peripheral form perception, effects of stimulus-object size and exposure time, and peripheral "fixation blindness." An experiment designed to test some predictions of this theory is described briefly. (*PsyA*, 1958, #132)

645. VALUE AND THE PERCEPTUAL JUDGMENT OF MAGNITUDE

Tajfel, H.
***Psychological Review*, v. 64, pp. 192–204, 1957**

Perceptual overestimation in respect to value can best be understood as a special case of accentuation of perceived differences. "The accentuation of differences between classes of stimuli occurs when these stimuli differ in some respects other than the dimension along which the subjects are reporting their judgments of quantity. The presence or absence of 'value' or 'relevance' is one such contrast." 28 references. (*PsyA*, 1958, #4920)

646. VISUAL PERCEPTION: AN EVENT OVER TIME

Smith, G.
***Psychological Review*, v. 64, pp. 306–313, 1957**

In this paper perception is considered as a microscopically short process of organization, the prestages of which are therefore important objects of study. Some theoretical and empirical approaches to this genetic analysis of perception (and personality) are discussed together with the topic of subliminal perception, which is of particular importance in this connection. (*PsyA*, 1959, #2876)

647. AN OPPONENT-PROCESS THEORY OF COLOR VISION

Hurvich, L. M. and Jameson, D.
***Psychological Review*, v. 64, pp. 384–404, 1957**

Presenting a summary "in providing a quantitative formulation for the Hering opponent-colors theory, and

in relating the postulated visual mechanism to specific problems of color sensation, color mixture and color discrimination; to the dependence of these functions on the physical variables of both stimulus wavelength and energy level; to their further dependence on adapting and surround stimulation; and to the changes in these functions that occur in various kinds of abnormal color vision." The theory is fruitful in systematizing isolated color phenomena and "the physiological concepts basic to the theory are . . . consistent with recent findings in neurophysiology." (*PsyA*, 1959, #2846)

648. A MICROGENETIC APPROACH TO PERCEPTION AND THOUGHT

Flavell, J. H. and Draguns, J.
***Psychological Bulletin*, v. 54, pp. 197–217, 1957**

The present paper has been prepared as a microgenetic approach to perception and thought. Within this approach, thoughts and percepts are believed to undergo a very brief, but theoretically important, microdevelopment. Evidence was offered both to support the possibility that such microdevelopments do occur in the normal process of thinking and perceiving and to suggest some of the formal characteristics of such evolutions. Further, an attempt was made to delineate some of the possible implications of this approach for cognitive functioning in abnormal individuals and normal individuals under atypical conditions. 139-item bibliography. (*PsyA*, 1958, #3652)

649. A THEORY OF PATTERN ANALYSIS FOR THE PREDICTION OF A QUANTITATIVE CRITERION

Lubin, A. and Osburn, H. G.
***Psychometrika*, v. 22, pp. 63–73, 1957**

650. THE HUMAN OPERATOR AS A SINGLE CHANNEL INFORMATION SYSTEM

Davis, R.
***Quarterly Journal of Experimental Phychology*, v. 9, pp. 119–129, 1957**

Reaction times to stimuli separated by short intervals, an auditory stimulus followed by a visual stimulus, were measured. "Results indicate that the pattern of delays at short intervals is the same as the pattern of delays when the stimuli are presented in one modality only. This suggests a model of the human operator functioning as a single channel through which information from both sense modalities has to pass before appropriate responses are organized." (*PsyA*, 1959, #2728)

651. SOME CHARACTERISTICS OF VISUAL PERCEPTION

Ames, A., Jr.
In "Life, Language, Law: Essays in Honor of Arthur F. Bentley,"
Taylor, R. W., Editor
The Antioch Press, Yellow Springs, Ohio, 1957, pp. 93–108

Several demonstrations are presented to illustrate the identifiable components which the perceiver contributes to his own perceptions. These psychological investigations reveal that perceivers do affect the what, where, when and how of that which they perceive. (*PsyA*, 1957, #5489)

652. PERCEIVING: A PHILOSOPHICAL STUDY

Chisholm, R. M.
Cornell University Press, Ithaca, N. Y., 1957

Thinking and talking about perceiving give rise to a number of puzzles which the author proposes to clarify. In order to discuss these problems adequately it is necessary to employ three non-physicalistic terms or locutions: "(1) an epistemic locution enabling us to say what we often say with such words as 'know,' 'perceive,' or 'see,' (2) a locution to perform one of the functions for which we usually employ the word 'appear,' and (3) an intentional term for which we ordinarily use the word 'believe'." Part I deals with the ethics of belief, Part II with the topic of evidence, and Part III with the objects of perception. An appendix contains a critical discussion of phenomenalism. (*PsyA*, 1958, #5)

653. ANALYSIS OF PERCEPTION

Smythies, J. R.
Humanities Press, New York, N. Y., 1957

A consideration of the ontological status of perception by a philosopher whose analyses range from logical, semantic and epistemological to experiential, experimental and neurological. The main arguments are presented in the first four chapters: (1) The Representative Theory of Perception; (2) The Genesis of the Visual Field; (3) The Status of Somatic Sense-Data; (4) Veridical and Hallucinatory Sense Experience. The fifth chapter is entitled:

Examination of "Perception." This is followed by a three-page chapter: The Status of Mind in Sherrington's Philosophy. (*PsyA*, 1957, #4150)

654. PERCEPTUAL DEVELOPMENT: AN INVESTIGATION WITHIN THE FRAMEWORK OF SENSORY-TONIC FIELD THEORY
Wapner, S. and Werner, H.
Clark University Press, Worcester, Mass., 1957

A monographic presentation of studies of perceptual changes in spatial organization which occur during growth between the ages of 6 and 19. The 11 experiments reported were undertaken and interpreted within the framework of sensory-tonic and developmental theory. Developmental changes in perception, sensory-motor response, and susceptibility to visual illusions are among the topics investigated. (*PsyA*, 1958, #119)

655. THE DEFINITION AND ANALYSIS OF PERCEPTUAL LEARNING
Wohlwill, J. F.
***Psychological Review*, v. 64, pp. 283–295, 1958**

"The development of a generalization of a previously established differential response to a new stimulus" is the criterion for perceptual learning. This definition distinguishes between learning due to perceptual functions and that due to response association. Hence, neither *S-R* associations nor reinforcement is necessary. Specific testable problems are discussed. 35 references. (*PsyA*, 1959, #9888)

656. AN APPLICATION OF A NONMETRIC MODEL FOR MULTIDIMENSIONAL ANALYSIS OF SIMILARITIES
Coombs, C. H.
June 1958
University of Michigan, Engineering Research Institute, Ann Arbor
R-2144-269-T
ASTIA AD-202,609

A nonmetric multidimensional model for analyzing similarities data is presented and its application to a confusion matrix on Morse Code signals is recounted. Some of the major problems remaining in the development of the model are summarized.

657. THE INFLUENCE OF IRRELEVANT INFORMATION UPON COMPLEX VISUAL DISCRIMINATION
Hodge, M. H. and Reid, L. S.
July 1958
University of Virginia, Psychological Lab., Charlottesville
SGO TR 537-58-2, DA 49-007-Md-537
ASTIA AD-201,312

Two experiments are reported which attempt to determine whether increasing amounts of irrelevant information, that is relevant under other conditions, detrimentally influence performance of a complex discrimination task. Two further questions asked were: (a) whether the effect of the irrelevant information is increased as the discrimination of the relevant information is made more difficult, and (b) whether the effect of the irrelevant information is reduced by practice. The experiments suggest the following conclusions: (1) irrelevant information which is relevant at other times will impair performance of complex discrimination tasks more than irrelevant information which is never relevant; (2) increases in amount of sometimes-relevant irrelevant information will produce progressively greater decrements in performance proficiency; (3) the detrimental effect of irrelevant information declines with practice; and (4) increase in the discrimination difficulty of the relevant information will enhance the effect of the irrelevant information.

658. VISION IN MILITARY ELECTRONICS
Wulfeck, J. W., Weisz, A., and Raben, M. W.
November 1958
Wright Air Development Center, Wright-Patterson AFB, Ohio
WADC TR 58-399
ASTIA AD-207,780

This report covers analysis of the requirements of vision, considering the human observer and taking into account many practical problems of perception encountered in various phases of flight. 2,268 references. (*A/SE*, August 1959)

659. VISIBILITY OF THE MACH BANDS AS A FUNCTION OF FIELD LUMINANCE
Ercoles, A. M. and Fiorentini, A.
1958

Instituto Nazionale di Ottica, Florence, Italy
AFOSR TN-59-781, AF 61(052)80
ASTIA AD-220,031

The visibility of a subjective contour (Mach band) was investigated as a function of luminance. It was found that the dark Mach band is visible at levels lower than the luminance threshold for the bright Mach band. At high levels, however, the luminance gradient required for the perception of the dark band is greater than the luminance gradient required for the bright band.

660. THE VISUAL-MOTOR FUNCTION
Ayres, A. J.
***American Journal of Occupational Therapy*, v. 12, pp. 130–138, 155–156, 1958**

Visual perception appears to play a highly important role in motor performance. "Difficulty in the visual-motor function is irrespective of upper or lower motor neuron disorder." The present paper discusses visual agnosia and upper extremity apraxia. "It is hypothesized that visual perception and probably perception of skilled movements involves a long slow process of establishing basic and integrating engrams." The principal factors which effect the organization of stimuli into perceptions include time, the relativity and intensity of stimuli, selectivity of response to stimuli, Gestalt function, as well as "establishing and recognizing relationships and the correlation of sensations arising from motor activity." The training of the patient in visual-motor performance must take cognizance of these factors. (*PsyA*, 1959, #7473)

661. SOME FACTS AND CONCEPTS REGARDING THE NEUROPHYSIOLOGY OF THE OPTIC PATHWAY
Bartley, S. H.
***A. M. A. Archives of Ophthalmology*, v. 60, pp. 775–791, 1958**

As a contribution to a recent symposium on visual mechanisms held in Bethesda, Maryland in September, 1957, this report contains a definition of vision, description of brightness enhancement, and of the alternation of response theory to account for brightness of the target in intermittent stimulation. Discussion of certain other works is appended. (*PsyA*, 1959, #5204)

662. PERCEPTION
Prentice, W. C. H.
***Annual Review of Psychology*, v. 9, pp. 1–18, 1958**

The annual review to April 1957 with 122-item bibliography. (*PsyA*, 1958, #3664)

663. INDAGINE SUL "PERSONAL SET" NELLA PERCEZIONE (INQUIRY INTO THE ROLE OF PERSONAL SET IN PERCEPTION)
Zavalloni, R.
***Antonianum*, v. 33, pp. 1–44, 1958**

Results of perceptual experiments indicate the importance of differential and genetic aspects in perception. The author favors a general theory of perception based on subjective factors. 86-item bibliography. (*PsyA*, 1959, #9540)

664. LA PERCEZIONE DEI MOVIMENTI (VISUAL PERCEPTION OF MOVEMENT)
Gemelli, A.
***Archivio di Psicologia, Neurologia y Psichiatria*, v. 19, pp. 3–12, 1958**

Preliminary to a series of forthcoming articles which will explore various problems of the perception of visual movement, the present article discusses perception of the simplest motions only and presents a method for studying perception of motion. Major aspects of the variables affecting perception of simple movements and of the characteristics of such perception are described. (*PsyA*, 1959, #5344)

665. OSSERVAZIONI SU IMMAGINI CONSECUTIVE E "AFTER-EFFECT" DI MOVIMENTO (OBSERVATIONS ON CONSECUTIVE IMAGES AND AFTER-EFFECT OF MOVEMENT)
Massucco Costa, A., Fonzi, A., and Vitrotti, G.
***Archivio di Psicologia, Neurologia y Psichiatria*, v. 19, pp. 115–139, 1958**

Diverse after-effects produced by plane figures in rotatory motion are described. Two types of after-effects are described, that of distortion and that of advancement–retrogression. The hypothesis is advanced that there exist different levels of perceptual integration. After-effects and consecutive images are considered to have a common basis in the phenomenon of contrast, probably intermodal in character. English, French, and German summaries are given. (*PsyA*, 1959, #7458)

666. SHAPE RECOGNITION: A REPLY TO DODWELL
Deutsch, J. A.
***British Journal of Psychology*, v. 49, pp. 70–71, 1958**

P. C. Dodwell (see *PsyA*, 1959, #644) criticized the author's theory of shape recognition (see *PsyA*, 1955, #6661) on three main grounds. A possible resolution of Dodwell's main objection—that animals discriminate tilt—was suggested. (*PsyA*, 1959, #7493)

667. SHAPE RECOGNITION: A REPLY TO DEUTSCH
Dodwell, P. C.
***British Journal of Psychology*, v. 49, pp. 158–159, 1958**

Some comments upon Deutsch's reply (see *PsyA*, 1959, #7493) to Dodwell's criticisms of a theory of shape recognition originally propounded by Deutsch. (*PsyA*, 1959, #7495)

668. SENSORY TRANSMISSION MECHANISMS
Milner, P. M.
***Canadian Journal of Psychology*, v. 12, pp. 149–158, 1958**

In visual, auditory, and gustatory discrimination finer differentiation is obtained than can be directly accounted for by differences in excitation of adjacent peripheral receptors. A neural mechanism or schema is presented which may sharpen and amplify differences through several afferent stages. "The qualities of sensation are no better defined at the periphery than are its spatial attributes." (*PsyA*, 1959, #9523)

669. SOME DEVELOPMENTAL AND OBJECTIVE FACTORS IN PERCEPTION
Schneyer, S. (Syracuse University, N. Y., 1958, Thesis)
***Dissertation Abstracts*, v. 19, pp. 182–183, 1958**

670. THE RELATIONSHIP OF VTE AS A PERCEPTUAL-COGNITIVE PROCESS TO THE INTRODUCTION OF A NOVEL STIMULUS
Richardson, A. M. (Bryn Mawr College, Pa., 1957, Thesis)
***Dissertation Abstracts*, v. 18, p. 2207, 1958**

671. MICROGENESIS AND CERTAIN PRIMITIVE PERCEPTUAL PROCESSES
Drobits, R. (University of Buffalo, N. Y., 1958, Thesis)
***Dissertation Abstracts*, v. 18, p. 2207, 1958**

672. WHAT YOU SHOULD KNOW ABOUT SIGHT
Dvorine, I.
***Education*, v. 78, pp. 381–382, 1958**

The author discusses seeing as a mental process at both cortical and subcortical levels of functioning and its need to be understood. The author analyzes these two levels in detail. (*PsyA*, 1959, #2733)

673. WHAT YOU SHOULD KNOW ABOUT SIGHT: PART II: THE SENSE OF SIGHT
Dvorine, I.
***Education*, v. 78, pp. 471–475, 1958**

The highest stage of perceptual development with the exception of abstract thinking is the individual's ability to project into outer space images which are aroused within the brain centers and to judge their distance in the surrounding environment. Clues aiding judgment are interposition, size, etc. Not all three-dimensional seeing is due to clues. Experience gained by other senses also contributes. The development of stereoscopic vision runs parallel with the development of manual skills. (*PsyA*, 1959, #2734)

674. FACTORS OF STIMULUS INTENSITY, STIMULATING TIME, LAPSED TIME AND SPATIAL DISTANCE IN PSYCHO-PHYSIOLOGICAL INDUCTION
Suzumura, K.
***Japanese Journal of Psychology*, v. 29, pp. 1–7, 1958**

Stimulation of a portion of the retina by a spot of light was shown to produce a sequence of alternating facilitation and inhibition of excitation in surrounding areas. This sequence was not altered by introduction of the factors of intensity, time, or distance. English summary. (*PsyA*, 1959, #9629)

675. ON THE MECHANISM OF BINAURAL FUSION
David, E. E., Jr., Guttman, N., and van Bergeijk, W. A.

Journal of the Acoustical Society of America, v. 30, no. 8, pp. 801–802, August 1958

A brief review is given of the work done by the authors in this field and of the varying conclusions reached by different workers. (*PsyA*, 1958, #8561)

676. SOME INFORMATIONAL ASPECTS OF FORM DISCRIMINATION

Krulee, G. K.

Journal of Experimental Psychology, v. 55, pp. 143–149, 1958

Through analogy between form discrimination and threshold determinations for multiple-unit displays, an explanation is offered for the relationship obtained between thresholds for the discrimination of forms and the amount of information transmitted by a choice. Several hypotheses are deduced from this analysis and are verified through the determination of distance thresholds for discrimination of a specially constructed set of forms. (*PsyA*, 1959, #5617)

677. PERCEPTUAL DEFENSE: AN INTEGRATION WITH OTHER RESEARCH FINDINGS

Chodorkoff, B. and Chodorkoff, J.

Journal of General Psychology, v. 58, pp. 75–80, 1958

A tentative, brief, and limited discussion of perceptual defense has been presented in relationship to findings in physiology and psychoanalysis. In this limited scope, an attempt is made to illustrate how awareness of research findings of related disciplines may be of importance in consolidating psychological theory. 16 references. (*PsyA*, 1959, #9747)

678. SENSORY EXPERIENCE AND BRAIN STRUCTURE

Le Gros Clark, W.

Journal of Mental Science, v. 104, pp. 1–13, 1958

Recent research on sensation is reviewed to throw light on the "sorting" of impulses on levels of sensory pathways, lower centers, reticular formation, and central functioning. (*PsyA*, 1959, #7395)

679. QUANTITATIVE EVALUATION OF COLOR PERCEPTION: AN HYPOTHESIS

De Kleine, E. H.

Journal of the Optical Society of America, v. 48, pp. 722–725, 1958

Characteristics of other photochemical processes are cited, which might also pertain to those of the retina. By assuming such relationship for retinal receptors, hypothetical formulas are derived for conversion of tristimulus values to physiological terms presumed to represent color perception. Substantial agreement between these physiological functions and actual observer response (ideal Munsell system) indicates a close degree of correlation. This approach is suggested as a basis for studying the problem of balanced perceptual color spacing. (*PsyA*, 1959, #9568)

680. EFFECT OF VISUAL SURROUND ON TRACKING PERFORMANCE

Conklin, J. E.

Perceptual and Motor Skills, v. 8, pp. 145–148, June 1958

681. PATTERN VISION IN YOUNG INFANTS

Fantz, R. L.

Psychological Record, v. 8, pp. 43–47, 1958

This study investigated discrimination and preferences for visual patterns using 30 infants from one to 14 weeks of age. It was concluded: (1) Visual patterns were discriminated by infants during the first 6 months, as evidenced by differential fixation times. (2) Changes in the strength or direction of the pattern preferences occurred around two months of age, independent of amount of testing. (3) Consistent visual preferences were present as early as the first two months, thus arguing against an extreme impericistic view of the development of visual organization and pattern discrimination. (4) The determination of natural visual preferences among different stimuli is a powerful method of studying early visual development which can provide data of importance to theories of perception, learning, and neural functioning. (*PsyA*, 1959, #7498)

682. PERCEPTION: EVOLUTION OF A CONCEPT

Bevan, W.

Psychological Review, v. 65, pp. 34–35, 1958

This treats with an examination of perceptual theories relative to general behavior theory. After presenting an overview of perceptual development, four perceptual

theories are outlined: (1) perception as conscious content with emphasis on Titchener, James, and Gestalt orientation; (2) perception and modern psychophysics dealing with Graham's behavioristic psychophysics, Helson's adaptation-level theory, Gibson's psychophysics of surface and edge, and Attneave's application of information theory model to form perception; (3) recent physiological models of perception—Hebb's cell-assembly theory of perceptual development, Werner and Wapner's sensory-tonic field theory, and ethological theory of instinctive behavior; and (4) modern functional views of McDougall, Woodworth, Brunswik, Ames and Cantril, Bruner and Postman, and Allport. Mention is made of the logical status of current perceptual theory and its general weakness. 73 references. (*PsyA*, 1959, #2719)

683. SENSATION AND PERCEPTION IN AN OBJECTIVE PSYCHOLOGY

Graham, C. H.

***Psychological Review*, v. 65, pp. 65–76, 1958**

A critical analysis of five important topics of sensation and perception shows (1) the important types of *S-R* relations relative to introspective descriptions, psychophysical discriminations, absolute judgments, and thresholds and perceptual functions; (2) operationally, sensation and perception are not specifically different; (3) problems of terminology are criticized and evaluated; (4) of the variables involved in recurring problems of perception the two major lines of attack have been studies of discrimination of stimulus conditions, and the past history and conditions of the S; (5) analysis of *S-R* functions involved in perception makes the study of perception coextensive with the general study of behavior. (*PsyA*, 1959, #7446)

684. TOWARD A UNITARY THEORY OF PERCEPTION

von Fieandt, K.

***Psychological Review*, v. 65, pp. 315–320, 1958**

To establish a unitary theory of perception it is necessary to investigate the conditions of the impressions of objects. "The phenomenal object gains in reality when the impressions are multi-dimensional. . . . It is the stimulus pattern as a system of relations, not as representing some 'substantial stuff,' which immediately gives rise to the impression of a three-dimensional world." (*PsyA*, 1959, #9537)

685. BASIC ISSUES IN PERCEPTUAL THEORY

O'Neil, W. M.

***Psychological Review*, v. 65, pp. 348–361, 1958**

Five basic issues among modern theories of perception are: perceiving as an active or passive process, the perceived as a real or as a phenomenal object, the perceived as a term or as a proposition, descriptive versus abstractive modes of analysis, and preferred location of causal conditions. As a result of these issues three workable theories have evolved: discrimination, phenomenalist, and judgmental. Relative strengths and weaknesses of the theories are discussed. 49 references. (*PsyA*, 1959, #9525)

686. NEURAL MECHANISMS IN PERCEPTION

Bruner, J. S.

***Research Publications of the Association of Nervous and Mental Diseases*, v. 46, pp. 118–143, 1958**

Use in psychology of obsolescent neurophysiology has made perception more controversial than it need be, and the shift to emphasis on integration and autogenic activity—the capacity of a complex network to hold up and to alter the characteristics of impulses transmitted to it, and the capacity of such a center to initiate activity that is transmitted elsewhere to affect control of afferent impulses travelling to the cortex and efferent impulses travelling away from it, is timely. Selective barriers may operate to alter perception at virtually any level of the nervous system. (*PsyA*, 1959, #7409)

687. PRINCIPLES OF PERCEPTION

Bartley, S. H.

Harper & Brothers, New York, N. Y., 1958

Written as a text for undergraduate courses, introductory chapters define and interpret perception. After discussing the development of perception, separate chapters are devoted to brightness discrimination, visual acuity, color and space perception, perceptual constancies, movement perception, basic and complex phenomena of hearing, kinesthetic, vestibular, chemical and cutaneous sensitivity, social perception, anomalies of perception and perception in everyday life. 277-item bibliography. (*PsyA*, 1958, #1153)

688. READINGS IN PERCEPTION

Beardslee D. C. and Wertheimer, M., Editors

D. Van Nostrand Co., Inc., Princeton, N. J., 1958

This collection of previously published papers is organized into five parts. Part I discusses recent knowledge

of physiological mechanisms in perceptual processes. Part II gives a brief history of the development of methods for studying perception. Part III deals with problems of perception of areas, figures, events and space. Part IV shows the relationships between percepts and images and the role of imagery in the total perceptual process. Part V deals with the perceptual problems of meaningful stimuli: word and symbol recognition, determinants of recognition, interpretation of situations, perceptual consequences of conflicting stimuli, and perceptual categorizing. (*PsyA*, 1959, #274)

689. THE EFFECT OF NOISE ON THE PERCEPTION OF FORMS IN ELECTROVISUAL DISPLAY SYSTEMS
Crook, M. N.
January 31, 1959
Institute for Applied Experimental Psychology, Tufts University, Medford, Mass.
Final Report, DA 49-007-md-536
ASTIA AD-218,902

Data were reported on the effect of visual noise on the perception of familiar and unfamiliar forms against plain and complex backgrounds in a prototype electro-visual system. Recognition-noise functions tended to be sigmoid, but to vary with the type of form and other conditions. Characteristics of forms having significance for recognizability did not lend themselves to simple geometrical specification. Subjects' response tendencies, of a type determined in part by the experimental context and not readily controllable, proved to be a significant factor in performance. Various characteristics of the display system, the forms, the backgrounds, and the experimental context interacted to produce complex data for which tentative interpretations are presented.

690. AN EXPERIMENTAL STUDY OF THE NATURE OF FORCED-CHOICE RESPONSES IN VISUAL DETECTION
Kincaid, W. M. and Hamilton, C. E.
January 1959
University of Michigan, Willow Run Labs., Ann Arbor
Report 2144-295-T, DA 36-039-sc-52654
ASTIA AD-210,276

Several hypotheses about the nature of forced-choice responses in visual detection were examined and their predictions tested. It was concluded (1) that the observer's response involves a comparison of sensory impressions from different presentation intervals on some, but probably not all, presentations; and (2) that the relation between ΔB (the added luminance of the target area) and the neural concomitants of response is basically nonlinear.

691. THEORETICAL MODELS FOR THE DISCRIMINATORY PROCESS IN VISUAL DETECTION
Kincaid, W. M.
January 1959
University of Michigan, Willow Run Labs., Ann Arbor
Report 2144-281-T, DA 36-039-sc-52654
ASTIA AD-210,338

A variety of theoretical models for the discriminatory process involved in visual detection under laboratory conditions have previously been proposed, ranging from simple threshold notions to theories of signal detection in the presence of noise. These models may be shown to represent variants of a more general model, which is expressed in terms of an abstract space corresponding with the set of possible states of the central nervous system. Different subsets of this space correspond to different responses. Each stimulus presented generates a probability distribution on the space. This formulation clarifies certain issues and suggests possible avenues of future research.

692. THE PERCEPTION OF SPACE WITH BINOCULAR DISPARITY CUES
Gogel, W. C.
April 13, 1959
Army Medical Research Labs., Fort Knox, Ky.
AMRL Report 379
ASTIA AD-214,459

A theoretical approach to the understanding of perceived space when the perceived depth component is supported only by binocular disparity cues is summarized. This approach emphasizes the perceptual interrelation of frontal and depth extents. Experimental data obtained from a number of studies are related to derived equations. These data are interpreted as offering considerable support for the theoretical position. This position is discussed in relation to the perceptual consequences of base and optical magnification.

693. RELATIONS BETWEEN VISIBILITY THRESHOLDS FOR SINGLE AND DOUBLE PULSES
Clark, W. C. and Blackwell, H. R.
April 1959
University of Michigan, Willow Run Labs., Ann Arbor
Report 2144-343-T, DA 36-039-sc-52654
ASTIA AD-215,127

The detectability of targets consisting of single light pulses of varying duration and of double light pulses of varying temporal separation was measured for seven observers. The data obtained verified the predictive adequacy of the temporal-contribution hypothesis, which postulates that each temporal element of a photic stimulus produces a pattern of neural activity spread out across time. This hypothesis uses double-pulse data to infer the function of the temporal-element contribution, which is then used to predict the relations between exposure duration and detection thresholds for single pulses. Both double-pulse and single-pulse data showed a characteristic not accounted for by the temporal-contribution function. For double-pulse targets presented for more than 0.07 sec, detectability increases. However, this result was quantitatively predictable by probability summation. Double pulses separated by more than 0.07 sec allowed an observer to detect the target by either of the two independent events represented by the two pulses. Thus, the neural activity aroused by the two pulses was broken by a cycling characteristic of the nervous system into a series of independent neural events suitable for probability summation. The light-adapted eye was found to be superior to the dark-adapted eye in detecting pulse interruption, but inferior in temporally summating photic energy.

694. PSYCHOPHYSIOLOGICAL ASPECTS OF SENSORY PERCEPTION AND DISCRIMINATION RELATING TO DESIGN CHARACTERISTICS, HUMAN UTILIZATION AND EVALUATION OF MAN-MACHINE SYSTEMS
Johns Hopkins University, Psychological Lab., Baltimore, Md.
May 1959
PR 1, Nonr-24855
ASTIA AD-216,207

695. REPETITION AND CONFIRMATION OF MESSAGES RECEIVED BY EAR AND BY EYE
Carterette, E. C. and Cole, M.
June 29, 1959
University of California at Los Angeles
TR 3, Nonr-23358
ASTIA AD-220,404

An attempt was made to determine how the auditory and visual modes of reception compare over successive repetitions of a message. The rating method was used to obtain operating characteristics for 60 heterogeneous words, and to make specific comparisons of the visual and auditory modes of reception. A single message was sent under difficult conditions of reception, and was repeated until it had been assigned to the highest accuracy category (confirmed) or until it had been sent a maximum of six trials. The comparisons made showed that over successive repetitions, accuracy of reception is a direct function of the confidence rating and is relatively independent of the intelligibility level. Neither do the accuracy of reception or the distributions of rating categories change markedly over trials. Although no direct test was made, it appears that accuracy of reception is not lessened by the task of rating. Again, both visual and auditory data are fitted reasonably well by predictions made from a simple stochastic model based on the assumptions that (1) intelligibility, (2) probability of a correct acceptance, and (3) probability of an incorrect acceptance remain constant over successive repetitions. Results showed that the concept of operating characteristic as used in the reception of messages in noise may be extended to include vision. The experiments suggest that any theory which is adequate to account for the complex discriminations found in the language-bound behavior of speech perception will go a long way toward accounting for visual perception of language. These two modes of perceiving involve disparate physical receptor systems, but the associated verbal and motor systems must be intimately connected.

696. PERCEPTUAL AND COGNITIVE PROCESSES IN INTERPERSONAL RELATIONS
Tagiuri, R.
June 30, 1959
Harvard University, Laboratory of Social Relations, Cambridge, Mass.

Final Report, NSori-07670
ASTIA AD-218,783

Contents: Perception and cognition of persons as objects; Symposium on person perception; Perception of feelings of like and dislike among members of groups; Perceptual grouping as a basis for visibility of interpersonal choice; Mutuality and its statistical significance; Unit formation in the perception of interpersonal attitudes; Interpersonal choice as a stimulus; Perceptual failure; Sociometric status and the meaning of choice; Comparing perception of choice and rejection; Influence and liking as dimensions of dyadic relationships; Cognitive and perceptual processes in judging people; Operating characteristics of trait lists and scales; Sex differences in inferring personality traits; Movement as a source of information about a person. Miscellaneous projects: Role differentiation and estimates of group opinion; Sociometric procedure and its effect upon choice status.

697. CONCEPT IDENTIFICATION AS A FUNCTION OF NUMBER OF RELEVANT DIMENSIONS
Ray, W. S.
July 1959
Bethany College, W. Va.
Technical Report 3, Nonr-231500
ASTIA AD-220,051

698. DIMENSIONAL ANALYSIS, LATENT STRUCTURE, AND THE PROBLEM OF PATTERNS
Lunneborg, C. E., Jr., Brandt, G., et al.
September 28, 1959
University of Washington, Seattle
Nonr-47708
ASTIA AD-226,073

A development study is presented of a technique of analysis dependent upon the configural dimensionality of a set of psychological measures. The problem of patterns arises from the criticism of traditional test scoring procedures that linearly combining item or test responses results in a loss of information inherent in the patterning or configuration of the responses. If pattern information is present for a set of measures over a sample of respondents, then, in terms of the general polynomial formulation, the higher order power and product terms should provide sources of variation independent of the variation possessed by the original measures. This proposition was recast in a form suitable to test by techniques conventionally associated with factor analysis. This new proposition was that the rank of a matrix of observations on a set of psychological measures augmented by higher order power and product terms should be greater than the rank of the matrix of observations on the original variables considered by themselves if any pattern information is present in those observations. Procedures are developed for relating this formulation to the principal axis solution developed by Horst (1953) and for restricting the rank determinations to sources of reliable variance. A method for handling the large number of power and product terms is included and limitations on its use are explored. Finally, the present technique and the problem of pattern analysis is compared with the technique of latent class analysis. The latter is shown to be a form of pattern analysis restricted to somewhat homogeneous sets of measures.

699. A PSYCHOACOUSTIC STUDY OF THE MECHANISM OF BINAURAL FUSION
Hall, J. L., II
1959
Massachusetts Institute of Technology, Department of Electrical Engineering, Cambridge
Thesis

700. THE INFLUENCE OF IRRELEVANT INFORMATION UPON COMPLEX VISUAL DISCRIMINATION
Hodge, M. H.
***Journal of Experimental Psychology*, v. 57, pp. 1–5, January 1959**

The purpose of this study was to determine whether increasing amounts of irrelevant information that is relevant under other conditions is detrimental to performance of a complex discrimination task; whether effect of irrelevant information is increased as the discrimination of the relevant information is made more difficult; and whether the effect of irrelevant information is reduced by practice. Thirty subjects were requested to identify one of sixteen complex geometric patterns to which irrelevant dimensions had been added. Response latencies were subjected to analysis of variance and tested for significance.

701. RECEPTOR MECHANISMS AND THE INTEGRATION OF SENSORY INFORMATION IN THE EYE
Hartline, H. K.

Reviews of Modern Physics, v. 31, no. 2, pp. 515–523, April 1959

The processing of sensory information begins in the sense organs themselves. It is in them that the first steps take place in the transformation of external influences into the patterns of nervous reaction that regulate the activity of an animal in its complex environment. The fundamental nature of the receptors and the design of the accessory structures in which the receptors are deployed determine how external information flows into the organisms. Thus, sense organ and receptor mechanisms determine the character of the neural activity that is passed on to higher neural centers. In addition, the first steps in neural integration take place within the sense organs, for in many of them the receptors interact with one another. As a result of both of these actions, patterns of sensory nerve fiber activity transmitted to the higher centers are more than mere replicas of the temporal and spatial patterns of external stimuli. Certain significant features of the stimulus patterns are accentuated at the expense of less important fidelity of representation. This can be clearly illustrated in the analysis of the first steps of the visual process, with which this paper deals.

702. SENSORY PERFORMANCE OF ORGANISMS

Rosenblith, W. A.

Reviews of Modern Physics, v. 31, no. 2, pp. 485–491, April 1959

(Appears also in "Biophysical Science," John Wiley & Sons, Inc., New York, N. Y., 1959, Chapter 52)

This paper is concerned with those aspects of organized neural complexity that permit organisms, such as man, to deal successfully with their sensory environment. Examples presented below illustrate how man, as an organism, detects, orders, and identifies events in his environment to which his sense organs are sensitive. The roles that stimulus intensity and time play in these operations are emphasized, as opposed to those aspects of sensory quality (pitch and hue, for example) for which one might expect the underlying mechanisms to differ rather considerably in going from one sensory modality to another.

Studies of communication processes in the nervous system should be based on a realistic view of the way in which the total organism reacts when it reaches selectivity into its surroundings—be it under self-instruction or under instructions from others—to process stimuli that have informational value. This emphasis upon the organism's behavior in communication tasks leads to a preoccupation with certain dependent and independent variables. It leads to an inquiry into the "operating characteristics" of the organism in order to be able to specify, albeit in a statistical manner, its maximum sensitivity, its resolving power, its dynamic range, its characteristics in the frequency and time domains, its information-handling capacity, and so forth.

The data presented in this paper come mainly from contemporary psychophysics. Subjects are not asked to introspect, but, rather, to indicate by standardized motor responses (most often verbal responses) whether they judge a stimulus to be present or not, whether they judge two stimuli to differ, whether they can order a set of stimuli or identify members of the set.

Assume that one is dealing with well-instructed cooperative subjects who are skilled in the execution of the expected response and who are familiar with the set of stimuli that will be presented to them.

Assume also that there is agreement on a program of stimulus presentation and on a method of response analysis. Thus, one must decide whether the admissable response categories shall be simply: "yes" and "no," "same" and "different," "more" or "less," or whether they should include the set of natural numbers. There must also be rules for dealing with false responses (false-alarm rate), and, finally, one must decide whether or not to quantify the temporal aspects of responding in addition to recording the mere emission of responses.

Such considerations may seem unnecessary details that should be left to methodologists, but unless there is a realistic understanding of the measurement and quantification problems in fields like psychophysics and neurophysiology, one can hardly evaluate the store of knowledge they have produced, or understand the relation of such knowledge to the knowledge that exists in the several areas of biophysics.

703. IDENTIFICATION OF ELEMENTARY AUDITORY DISPLAYS AND THE METHOD OF RECOGNITION MEMORY

Pollack, I.

Journal of the Acoustical Society of America, pp. 1126–1128, August 1959

704. IN DEFENSE OF THE BAT
Freedman, J.
Massachusetts Institute of Technology, Lincoln Lab., Lexington, Mass.
***Contemporary Psychology*, v. 4, no. 11, November 1959**

The bat's built-in radar detection system is considered.

705. DETECTION OF STATISTICALLY DEFINED PATTERNS IN A MATRIX OF DOTS
Green, B. L., Jr., Wolf, A. K., and White, B. W.
***The American Journal of Psychology*, v. 72, no. 4, pp. 503–520, December 1959**

706. DETECTION OF A PULSED SINUSOID IN NOISE AS A FUNCTION OF FREQUENCY
Green, D. M., McKey, M. J., and Licklider, J. C. R.
***Journal of the Acoustical Society of America*, v. 31, no. 11, pp. 1446–1452, December 1959**

The detectability of a pulsed sinusoid (0.1 sec) in white noise was measured at sixteen frequencies ranging from 250 to 4000 c/s. The measurements are compared with the results previously obtained from experiments in which continuous sinusoids of indefinite duration were used. The dependence of detectability on frequency appears to be very similar in all the experiments. The detectability of compound signals, i.e., signals with 12 and 16 sinusoidal components, was also measured. A comparison of the detectability for the single and combined sinusoids allows the approximate determination of how the auditory system sums energy over frequency. (*PA*, 1960, #814)

707. INFORMATION THEORY AND THE HUMAN VISUAL SYSTEM
Singer, J. R.
***Journal of the Optical Society of America*, v. 49, no. 6, pp. 339–340, June 1959**

The paper views the human visual system within the frame of reference of a digital computer. The analogy is detailed.

An extended version of this paper was presented by the author at the URSI meeting, Washington, D. C., May 25, 1957. Related topics were discussed by Dr. Jay Best on behalf of the author at the National Biophysics Conference in Columbus, Ohio.

708. LINEARITY OF THE TRACKING PERFORMANCE FUNCTION
Conklin, J. E.
***Perceptual and Motor Skills*, v. 9, pp. 387–390, December 1959**

709. NEURAL FORMULATION OF THE EFFECTS OF TARGET SIZE AND SHAPE UPON VISUAL DETECTION
Kincaid, W. M., Blackwell, H. R., and Kristofferson, A. B.
***Journal of the Optical Society of America*, v. 50, no. 2, pp. 143–148, February 1960**

A hypothesis is presented, the chief assumptions of which are that neural impulses originating in retinal receptors converge upon neurons in a central area, and that the excitation of the most excited neuron in that area determines the response. The relation of this hypothesis to earlier ideas along similar lines is discussed. It is shown that the hypothesis leads to testable relationships between thresholds for circular targets and for targets of other shapes. Evidence is presented that diffuse neural connections are relatively more important at low background levels, and an interpretation is suggested.

MACHINE LEARNING AND MEMORY

710. MULTICOLOR STORAGE TUBE

Smith, S. T.
Hughes Aircraft Co., Culver City, Calif.
Summary Report July 1, 1953–August 31, 1954, WADC 54-538, AF 33(616)2177
ASTIA AD-55,197

Multicolor storage tubes have been made by modification of direct-viewing storage tubes. A perforated mask placed between the electron guns and storage surface allows electrons from one writing gun to strike only certain storage-surface areas which are in register with a color phosphor in the viewing screen. Likewise, the perforated mask allows electrons from the second writing gun to strike only certain other storage surface areas which, in turn, are in register with a second color phosphor printed on the viewing screen. Thus, simultaneous writing and storage of electrical signals in two or more colors can be achieved. Three tubes with 5-in. diam. and electrostatic deflection have been made which demonstrate the operating principles but do not yield pure colors over all of the storage surface. Work is continuing to improve color purity. Demountable techniques and magnetic deflection are now being employed. Effort is directed towards obtaining a magnetically deflected 15-in. diam. tube suitable for application testing.

711. CONDITIONAL PROBABILITY MACHINES AND CONDITIONED REFLEXES

Uttley, A. M.
In "Automata Studies," Shannon, C. E. and McCarthy, J., Editors,
Princeton University Press, N. J., 1956

712. OPTICAL MEMORY PANELS

Gardner, W. L., Barker, D. B., and Zimmerman, M. D.
March 7, 1957
Massachusetts Institute of Technology, Lincoln Lab., Lexington
Technical Report 153, AF 19(122)458
ASTIA AD-137,719

The design and theory of operation are discussed for display devices which use the solid-state processes of electroluminescence and photoconductivity. This flat panel display consists of an array of small discrete cells each of which operates in its bistable mode independent of its neighbors. Each cell consists of an electroluminescence (EL) source, 0.025 in. in diameter, which simultaneously provides the information display and light for feedback through the glass light pipe to the surface of the series photoconductor (PC). Oils and plastics were commonly used as embedments; Sylvania Electric Products, Inc. developed a lamp (Panelescent) which used a fused powder. As a PC material, a doped CdS in a finely divided, multicrystalline state fulfilled most of the requirements. Corning Glass Works developed a Fotoform glass which permits shaping to many complex geometries. The glass which is shaped by a combination of photographic processes and acid etchings is a photosensitive material with UV response. The applications of the memory panels are divided into the following groups according to the method of triggering employed: electron-beam, light, and voltage-pulse triggering. The utilization of optical memory panels as internal computer memories is discussed.

713. MEMORY IN MAN AND MACHINES

Geyer, B. H. and Johnson, C. W.
***General Electric Review*, v. 60, no. 2, pp. 29–33, March 1957**

Electronic memory sometimes bears striking resemblance to its human counterpart; mode of information storage in brain as compared with action of electronic devices; storage media based on magnetic or electrostatic principles; types of storage devices for digital computers and for communication systems. (*EI*, 1957)

714. FINDING CHEMICAL RECORDS BY DIGITAL COMPUTERS

Ray, L. C. and Kirsch, R. A.
***Science*, v. 126, no. 3278, pp. 814–819, October 1957**

Report on long range program by National Bureau of Standards and United States Patent Office to develop and

apply automatic techniques of information storage and retrieval to problems of patent search; solutions obtained in problem of searching chemical structures. (*EI*, 1958)

715. ON COMMUNICATION PROCESSES INVOLVING LEARNING AND RANDOM DURATION
Bellman, R. and Kalaba, R.
January 23, 1958
RAND Corp., Santa Monica, Calif.
P-1194

This report treats the aspects of communication problems involving the use of a channel whose statistical properties are not completely known, and those involving processes of random duration. Application of the functional equation technique to the problems arising from incomplete information is illustrated.

716. LEARNING MACHINE–1
Friedberg, R. M.
IBM Journal for Research and Development, v. 2, no. 1, pp. 2–13, January 1958

Preliminary experiments in which program of stored-program computer is gradually improved by "learning" procedure which tries many programs and chooses, from instructions that may occupy given location, one most often associated with success; computer would thus learn to solve problems for which it was not given precise methods. Results showing limited success are reported. (*EI*, 1958)

717. A COMPONENT CASE HISTORY; INFORMATION STORAGE DEVICES: A KEY TO AUTOMATION: PART I AND PART II
Bengston, R. J. and Smith, J. E., Jr.
Computers and Automation, Part I, v. 7, no. 4, p. 11, April; Part II, v. 7, no. 5, p. 14, May 1958

718. PANDEMONIUM, A PARADIGM FOR LEARNING
Selfridge, O. G.
Proceedings of the Symposium on Mechanization of Thought Process, National Physical Lab., Teddington, England, November 1958

719. IMITATION OF PATTERN RECOGNITION AND TRIAL-AND-ERROR LEARNING IN A CONDITIONAL PROBABILITY COMPUTER
Uttley, A. M.
Reviews of Modern Physics, v. 31, no. 2, pp. 546–548, April 1959

A conditional probability computer, appropriately connected with input and output devices, can "recognize" patterns and "learn" by trial and error. The principle of such a system developed at the National Physical Laboratory is described briefly in this paper, together with some comments on the role of engineering in the study of biological problems.

720. EXPERIMENTS IN MACHINE LEARNING AND THINKING
Kilburn, T., Grimsdale, R. L., and Sumner, F. H.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 303–309

721. A MACHINE MODEL OF RECALL
Stevens, M. E.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 309–315

722. SYMPOSIUM ON THE INFLUENCE OF VERY LARGE MEMORY DESIGNS AND CAPABILITIES ON INFORMATION RETRIEVAL
King, G. W., Coordinator
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 479–483

723. APPLICATION OF IPL-V TO THE SIMULATION OF PERCEPTUAL LEARNING
Shepard, R. N.
September 1959
American Psychological Association, Cincinnati, Ohio
Paper

that most motivation was modified by learning in higher animals. The term is a logico-scientific construct; it is observable not directly but through modification of activities. Hull's is the best elaborated theory of learning. He classifies learned motivations as secondary. The analytic school considers secondary motivations as dependent on primary, while the solistic group considers them autonomous. (*PsyA*, 1956, #6880)

739. ON THE INTERACTION OF SIMULTANEOUS RESPONSES
Meyer, D. R.
July 8, 1952
Ohio State University Research Foundation, Columbus
HRRC Research Bulletin 53–52 (December 1953), AF 33(038)10528
ASTIA AD-22,723

The theory of motor reactions, physiological effects of proprioception, and physiological factors in learning are all considered.

740. NUMBER OF COMMON ELEMENTS AND CONSISTENCY OF REINFORCEMENT IN A DISCRIMINATION LEARNING TASK
French, R. S.
July 11, 1952
Perceptual and Motor Skills Research Lab., Air Training Command, San Antonio, Texas
HRRC Research Bulletin 53–12
ASTIA AD-14,726

741. COMPLEX LEARNING AND CONDITIONING AS A FUNCTION OF ANXIETY
Farber, I. E. and Spence, K. W.
September 10, 1952
Iowa State University, Iowa City
N9onr-93802
ASTIA AD-4,575

742. CONDITIONING AND EXTINCTION AS A FUNCTION OF ANXIETY
Spence, K. W. and Farber, I. E.
September 10, 1952
Iowa State University, Iowa City
N9onr-93802
ASTIA AD-4,511

743. ANXIETY, ANXIETY REDUCTION, AND STRESS IN LEARNING
Deese, J., Lazarus, R. S., and Keenan, J.
October 28, 1952
Johns Hopkins University, Baltimore, Md.
HRRC Research Bulletin 53–56 (December 1953), AF 33(038)22624
ASTIA AD-22,307

744. INHIBITION OF THOUGHT CATEGORIES UNDER STRESS: AN EXPLORATORY STUDY
Coonan, T. J. and Cofer, C. N.
1952
Maryland University, College Park
Technical Report 18, N7onr-397, T.O. 3
ASTIA AD-3,307

The possibility of learning to stop thinking as a means of avoiding punishment was investigated. A list of words known to produce either a high proportion of antonyms or synonyms was presented one at a time to individual subjects. During the presentation of the first half of the list half of the subjects were shocked when they gave an antonym to an antonym-producing word, the other half when they gave a synonym to a synonym-producing word. The remainder of the list was presented without shock. The test results for those subjects who figured out the shock pattern were eliminated. The response latencies and frequencies for antonym-producing words did not differ under synonym or antonym shock. The latencies for response to the synonym-producing words increased under the synonym shock condition, but the frequency of synonym response declined under the antonym shock condition instead of the synonym shock condition. Several methodological issues are suggested as possible reasons for the unsatisfactory results.

745. A CRITICAL EVALUATION OF THE CURRENT STATUS OF LEARNING THEORY
Smedslund, J.
***Nordisk Psykologi*, Monograph No. 2, 1952**

An English text treatment which attempts an operational and theoretical reformulation of the problems of learning theory. Several common theories of learning are criticized with the observation that "learning consists in

the organization of central structures." Learning is also discussed in relation to Piaget's theory of child development. 73-item bibliography. (*PsyA*, 1954, #525)

746. LEARNING THEORY AND CULTURE

Moore, O. K. and Lewis, D. J.
***Psychological Review*, v. 59, pp. 380–388, 1952**

A review appears in *Journal of Symbolic Logic*, v. 24, no. 1, p. 85, 1959

747. A "COMMUNICATION ANALYSIS" OF CONCEPT LEARNING

Hovland, C. I.
***Psychological Review*, v. 59, pp. 461–472, 1952**

748. LEARNING THEORY

Mowrer, O. H.
***Review of Educational Research*, v. 22, pp. 475–495, 1952**

An examination of the learning theory in historical perspective from the time of William James, J. McKeen Cattell, John Dewey, and Edward L. Thorndike to 1952. The 49 studies cited are discussed under the rubrics of reflex arc versus consciousness, conditioning or "stimulus variability," learning as problem solving, a constructive synthesis, and implications and corroborative evidence. There has been, during the past 60 years, a change "from a simple and pretty clearly inadequate, *S–R* psychology to an *S–R*:*S–R* psychology." (*PsyA*, 1954, #57)

749. CURRENT INTERPRETATIONS OF LEARNING DATA AND SOME RECENT DEVELOPMENTS IN STIMULUS-THEORY

Spence, K. W.
In "Kentucky Symposium: Learning Theory, Personality Theory, and Clinical Research," University of Kentucky, Lexington, March 13–14, 1953, pp. 1–21

Following a brief discussion of the nature of learning theories and of the situations they deal with, it is pointed out that it was unnecessary for Hull to make additional assumptions in the case of the three measures of response ($R_{\%}$, R_T, and R_N), since their functions necessarily follow from previous assumptions. The multiplicative relationship of the motivational variables *V*, *K*, and *D* is questioned and an additive relationship suggested instead. (*PsyA*, 1955, #491)

750. THE PREMATURE CRYSTALLIZATION OF LEARNING THEORY

Maier, N. R. F.
In "Kentucky Symposium: Learning Theory, Personality Theory, and Clinical Research," University of Kentucky, Lexington, March 13–14, 1953, pp. 54–65

The type of research reported in this paper suggests that the concept of reinforcement, so important to present learning theory, requires re-examination. An attempt to incorporate association formation, motivation, and perception into a single quantitative theory seems premature, since our knowledge of each of these processes still is in a state of development. To combine them all into a reinforcement concept buries the problems rather than stimulates analysis. (*PsyA*, 1955, #470)

751. EGO PSYCHOLOGY, CYBERNETICS, AND LEARNING THEORY

Mowrer, O. H.
In "Kentucky Symposium: Learning Theory, Personality Theory and Clinical Research," University of Kentucky, Lexington, March 13–14, 1953, pp. 81–90

"What is learned are attitudes, meanings, or expectations which consist of token decrements in emotional tension (secondary reinforcements, or rewards) and token increments (secondary motivation, or punishment). It is assumed that it is these inner, conscious factors which, moment by moment, select and shape overt action; and if we take this position we have ample provision for 'learning' without doing; e.g., for changes in behavior that occur, solely and immediately, because the situation, or, more exactly, the individual's internal tension state, or 'field,' has changed." The concepts of positive and negative feedback are discussed in terms of the psychology of the ego and the superego. (*PsyA*, 1955, #474)

MODELS AND THEORIES OF LEARNING

729. TENSION IN LEARNING AND ASSOCIATION
Bills, A. G.
Proceedings of the Ninth International Congress on Psychology, Springer-Verlag, Berlin, 1929, pp. 75–76

730. INHIBITION AND LEARNING
Winsor, A. L.
Psychological Review, v. 36, pp. 389–401, 1927

731. HYPOTHESIS VERSUS "CHANGE" IN THE PRE-SOLUTION PERIOD IN SENSORY DISCIMINATION LEARNING
Krechevsky, I.
Publications in Psychology, University of California, v. 6, pp. 27–44, 1932

732. MATHEMATICS—DEDUCTIVE THEORY OF ROTE LEARNING. A STUDY IN SCIENTIFIC METHODOLOGY
Hull, C. L. and Hovland, C. I.
Yale University Press, New Haven, Conn., 1940

A review is presented in *Journal of Philosophy*, v. 37, pp. 277-278, 1940.

733. MATHEMATICS—DEDUCTIVE THEORY OF ROTE LEARNING. PART II. THE LOGICAL SYSTEM
Hull, C. L., Hovland, C. I., et al.
Yale University Press, New Haven, Conn., 1940

A review is presented in *Psychological Bulletin*, v. 37, pp. 815–817, 1940.

734. THE FORMATION OF LEARNING SETS
Harlow, H. F.
Psychological Review, v. 56, pp. 51–65, 1949

735. LEARNING AND RETENTION OF AN "UNEXPECTED" CONTROL DISPLAY RELATIONSHIP UNDER STRESS CONDITIONS
Vince, M. A.
1950
Medical Research Council, Applied Psychological Unit, Psychology Lab., Cambridge, England
R 125/50

736. CONTRIBUTIONS TO THE MATHEMATICAL BIOPHYSICS OF THE CENTRAL NERVOUS SYSTEM, WITH SPECIAL REFERENCE TO LEARNING
Shimbel, A.
Bulletin of Mathematics and Biophysics, v. 12, p. 241, 1950

737. TEMAS DA PSICOLOGIA DE APRENDIZAGEM (THEMES OF THE PSYCHOLOGY OF LEARNING)
Gomes Penna, A.
Anuario do Instituto de Psicologia, v. 1, pp. 81–103, 1951

Learning theory is today the central area of most psychology. The two principal theories are: (1) associative, or the progressive modification of behavior by reinforcement of receptor connections or fixation of new ones; (2) structuralist, or a progressive "insight" into problems. Motivation, primary and secondary, is considered essential to learning; Allport, contrary to the neobehaviorists, considered secondary motivations autonomous. Interest is identified as a secondary motivation; in education interest is considered intrinsic, which is cumulative, or extrinsic. Little transfer of learning is found in motor areas, but more in learning involving mental processes. (*PsyA*, 1956, #6856)

738. O PROBLEM PSICOLOGICO DA MOTIVAÇÃO (THE PSYCHOLOGICAL PROBLEM OF MOTIVATION)
Schneider, E.
Anuario do Instituto de Psicologia, v. 1, pp. 135–138, 1951

Motivation has generally supplanted the term instinct, as it is based on observable descriptions. McDougall first seriously studied motivation, judging that for each "propensity" there was a corresponding emotion. He found

724. AN INTELLIGENCE STORAGE SYSTEM
Weir, D. A.
September 15, 1959
International Standard Electric Corp.,
New York, N. Y.
Patent 2,904,778; Washington, D. C.

725. A SELF ORGANIZING LOGICAL SYSTEM
Mattson, R. L.
Paper presented at the 1959 Eastern Joint Computer Conference, Boston, Mass., December 1–3, 1959
Institute of Radio Engineers, New York, N. Y.

726. PLASTIC NEURONS AS MEMORY ELEMENTS
Willis, D. G.
1959 IRE WESCON Convention Record, v. 3, Part 4, pp. 55–65, 1959
(See also Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 290–298)

Class of plastic neuron models are defined, and their information storage capacity determined; mechanism by which information can be read into and out of system of such neurons on random access basis is then discussed; devices of this kind show promise in economical construction of machines that can solve pattern recognition and learning problems. (*EI*, 1959)

727. ON THE THEORY OF PROCESS ADAPTIVE CONTROL SYSTEMS, THE LEARNING MODEL APPROACH
Margolis, M.
May 1960
University of California at Los Angeles
Report 60-32, AFOSR TN 60-618, Project 9783, AF 48(638)438
ASTIA AD-241,887

The theory of feed-back control is extended to those systems that operate in a widely changing environment. The concept of a process adaptive control system using the learning model approach to determine the dynamic characteristics of the physical process is explored. The particular method devised for determining the dynamic characteristics of the process makes use of a learning model, and a mechanism for adjusting the parameters of the learning model. It is the function of the adjusting mechanism to so set the parameters of the model that the model will behave as much like the process as possible. Having adjusted the parameters of the model so that they adequately describe those of the process, the parameters may be used in the computing circuits of the programmer. The programmer then determines and sets the parameters of the controller according to the control laws devised by the system designer. The controller's parameters are adjusted so that the entire control system operates in a satisfactory manner despite adverse environmental conditions. The particular method for adjusting the parameters of the learning model is based on an approximation to the method of steepest descent. The equations describing the operation of the adjusting mechanism are derived and result in a nonlinear nonautonomous system. The stability and dynamic response of the learning mechanism are examined by both analytic methods and computer experiments. The learning mechanism was found capable of tracking the parameters describing the process for a wide variety of actuating signals.

728. COMPUTER SIMULATION OF CONCEPT ATTAINMENT
Hovland, C. I. and Hunt, E. B.
Behavioral Science, v. 5, no. 3, pp. 265–267, July 1960

752. LEARNING: AN ASPECT OF PERSONALITY DEVELOPMENT
Snygg, D.
In "Kentucky Symposium: Learning Theory, Personality Theory, and Clinical Research," University of Kentucky, Lexington, March 13–14, 1953, pp. 129–137

Previous theorizing has treated learning as a more or less separate and independent psychological process. Learning theories and personality theories then become incompatible since the first explains why people change, and the second explains why they do not change. "If we adopt a dynamic field as the model for our conceptual system, it is easy to avoid the separation between learning theory and personality theory that has caused so much trouble." (*PsyA*, 1955, #414)

753. THE CONTINUOUS REGULATION OF SKILLED RESPONSE BY KINAESTHETIC FEED BACK
Gibbs, C. B.
March 1953
Applied Psychology Research Unit, Cambridge, Great Britain
Report APU 190/53
ASTIA AD-12,231

The effect of proprioceptive stimulation on learning a visuomotor skill was studied by altering the method of response from free-moving isotonic to pressure-control isometric conditions. A total of 95 normal subjects and one tabetic patient were required to control the output of a velocity-control servomechanism by tracking a two-dimensional spot on a CRO screen. Greater accuracy and more learning resulted with the pressure-control method; transfer effects also favored this method. The results implied that the skilled movements were continuously regulated by kinesthetic data which were generated by the moving limb and continuously fed back to the higher motor centers. An hypothesis of rate control is presented in which the extent of movement is estimated by integrating a known rate of movement over a known period of time.

754. SYMPOSIUM ON PSYCHOLOGY OF LEARNING BASIC TO MILITARY TRAINING PROBLEMS, 7-8 MAY, 1953
Committee on Human Resources, Research and Development Board, Washington, D. C.
Report HR-HTD 201/1
ASTIA AD-18,390

A series of talks were presented on the practical and theoretical aspects of learning with regard to military training problems. The following topics were discussed: theories of human learning and problems of training, models for learning theory, motor skills learning, learning for performance in groups, the role of motivation in learning, motivational factors in verbal learning, perceptual learning in relation to training, and human problem-solving.

755. HORMONAL INFLUENCES IN LEARNING: THE PITUITARY–ADRENAL SYSTEM, ANXIETY, AND AVOIDANCE LEARNING
Applezweig, M. H. and Moeller, G.
October 1953
Connecticut College, New London
Research Report September 1, 1951–September 30, 1953, Nonr-99601
ASTIA AD-20,271

Eighteen studies were undertaken to evaluate the role of the pituitary–adrenocortical system in avoidance learning. Studies of food and water intake, activity, shock-and light-escape and avoidance learning, and emotional conditioning were conducted with various combinations of hypophysectomized, adrenalectomized, sham-operated, and normal albino rats. ACTH was administered in four of these studies. Analysis of the results lead to the rejection of the hypothesis that an intact pituitary–adrenal system is necessary for avoidance learning, and raised the possibility that pituitary action elsewhere may be an important factor in this type of learning. ACTH-injections appeared to restore partially the learning capacity of hypophysectomized rats. Some alternative hypotheses are discussed.

756. SPENCE ON THE PROBLEM OF PATTERNING
Bitterman, M. E.
***Psychological Review*, v. 60, pp. 123–126, 1953**

A weakness in Spence's extension of his theory of discriminative learning to the problem of stimulus patterning lies in the restricted role assigned to "transverse

patterning." Experimental evidence is presented to suggest that a more fundamental modification of Spence's theory is needed than has yet been proposed. (*PsyA*, 1954, #3928)

757. PURPOSE AND LEARNING THEORY

Moore, O. K. and Lewis, D. J.
***Psychological Review*, v. 60, pp. 149–156, 1953**

An attempt is made to demonstrate that a revised formulation of the teleological frame of reference is consistent with Hullian views of the learning process and, indeed, "that the reinforcement theorists have been making use of this frame of reference." It is contended that the very concept of learning itself can be meaningfully used only within the teleological framework. (*PsyA*, 1954, #3975)

758. A SINGLE THEORY FOR REMINISCENCE, ACT REGRESSION, AND OTHER PHENOMENA

Saltz, E.
***Psychological Review*, v. 60, pp. 159–171, 1953**

An eight-assumption revision of Spence's transposition theory is outlined and then shown to be relatively consonant with past research in the areas of instrumental learning, verbal learning, and classical conditioning. In addition, a number of as yet untested experimental deductions are made explicit from the assumptions of the theoretical model. The author makes clear that the assumptions of the model are not at all times consistent with the Hullian position as now formulated. 44 references. (*PsyA*, 1954, #3987)

759. LEARNING AND THE PRINCIPLE OF INVERSE PROBABILITY

Bakan, D.
***Psychological Review*, v. 60, pp. 360-370, 1953**

The principle of inverse probability "formulates the effect on the probability of a theory of a confirmation." The author goes on to develop an expectancy-like theory of learning on the basis of a mathematical statement of this principle. The theory is proposed as incorporating some of the most important aspects of stimulus-response theory and Gestalt theory. The article is concluded with an attempt to provide answers to Hilgard's six questions for the classification of learning theories. (*PsyA*, 1954, #5591)

760. SOCIAL PERCEPTION AND THE PSYCHOLOGY OF PERCEPTUAL LEARNING

Gibson, J. J.
In "Group Relations at the Crossroads,"
Sherif, M. and Wilson, M. D., Editors,
Harper and Brothers, New York, N. Y., pp. 120–138

It is still not understood how learning operates in perception, nor how one learns to perceive. Neither the behaviorists, nativists, nor the Gestaltists have solved these problems. Possibly a new approach is desirable. 22 references. (*PsyA*, 1954, #6936)

761. A STATISTICAL ANALYSIS OF THE PARAMETERS OF MOTOR LEARNING

Roff, M., Payne, R. B., and Moore, E. W.
February 1954
School of Aviation Medicine, Randolph Field, Texas,
Report 1, Project 21-0202-0001
ASTIA AD-54,883

Correlations among multiple scores obtained from three motor learning situations, and from printed tests, were factor analyzed. Learning scores included performance level, rate of change, gain, and variability. Sixteen factors were obtained. Correlations between factors obtained in a given situation differed from those obtained in other situations, although similar factors were found in all three. Correlations between correspondent factors from one situation to another and between these and printed test factors indicated a high degree of inter-situation specificity, leading to a general mathematical development of the problem of correlation between gains.

762. RETROACTION AS A FUNCTION OF DISCRIMINATION AND MOTOR VARIABLES

Ritchie, M. L. and Muckler, F. A.
March 29, 1954
University of Illinois, Training Research Lab., Urbana
Report, AFPTRC TN-55-80 (December 1955), AF 33(038)25726
ASTIA AD-102,528

In a retroaction experiment, three variables were investigated: (1) variations in the nature of the interpolated tasks, (2) variations in amount of original learning, and (3) variations in amount of interpolated learning. The interpolation of a discrimination task resulted in interference while interpolation of the motor task gave facilitation. Increasing the amount of original learning resulted in decreasing facilitation for the motor interpolated task and increasing interference for the discrimination interpolated task. Increasing the amount of interpolated learning resulted in increasing facilitation for the motor interpolated task and increasing interference for the discrimination interpolated task. The implications of these results are discussed for: (1) a two-stage analysis of psychomotor performance, (2) differences between verbal learning and psychomotor learning, and (3) retroaction theory."

763. CONTIGUITY VS. DRIVE REDUCTION IN CONDITIONED FEAR: THE PROXIMITY AND ABRUPTNESS OF DRIVE-REDUCTION
Mowrer, O. H. and Soloman, L. N.
***American Journal of Psychology*, v. 67, pp. 15–25, 1954**

The acquisition by an initially neutral stimulus (flashing light) of the capacity to elicit a fear response in rats is shown to be contingent upon what occurs when the noxious stimulus (electric shock) first occurs, rather than being dependent on either proximity or abruptness of drive reduction. These findings are derived from experiments in which groups of rats received an unconditioned stimulus (shock) in one of four ways—brief shock (3 sec) with abrupt onset and termination, long shock (10 sec) with abrupt onset and termination, brief shock (4 sec) with abrupt onset and gradual termination, and long shock (7 sec) with abrupt onset and gradual termination. The results are interpreted to support Mowrer's two factor learning theory in contradistinction to Hull's monistic theory. (*PsyA*, 1955, #477)

764. CONTIGUITY VS. DRIVE-REDUCTION IN CONDITIONED FEAR: TEMPORAL VARIATIONS IN CONDITIONED AND UNCONDITIONED STIMULUS
Mowrer, O. H. and Aiken, E. G.
***American Journal of Psychology*, v. 67, pp. 26–38, 1954**

Five groups of albino rats were run in a conditioning experiment in which the temporal relationship between the conditioned stimulus (flashing light) and unconditioned stimulus (electric shock) were systematically varied. Group one received the *CS* (duration of three sec) immediately prior to the *UnS* (10 sec), in the second group both were introduced at the same time, in the third group the *CS* was introduced for the last three seconds of the *UnS*, in the fourth group the *CS* came immediately after the *UnS*, and in the fifth group the *CS* occurred two minutes after termination of the *UnS*. Curves of inhibition of hunger motivation indicate a progressive decrease in inhibition from groups one through five. The findings are interpreted as being consistent with a two factor learning theory. (*PsyA*, 1955, #476)

765. LOGICAL ANALYSIS OF LEARNING, CONDITIONING AND RELATED PROCESSES
Haldane, J. B. S.
***Behaviour*, v. 6, pp. 256–270, 1954**

An attempt is made to enumerate the types of changes in behavior which can arise as the result of an experience (conditioning, learning, etc.). All possible results are special cases of the general case that the response occurs neither before nor after learning in some situations A, after but not before in situations B, before but not after in situations C, and both before and after in situations D. (*PsyA*, 1955, #6849)

766. LEARNING AND INTELLIGENCE: A STUDY OF THE RELATIONSHIP BETWEEN INTELLIGENCE AND REINFORCEMENT
Basescu, S. (Princeton University, N. J., 1953, Thesis)
***Dissertation Abstracts*, v. 14, p. 181, 1954**

767. COMMON AND UNIQUE ELEMENTS IN HUMAN DISCRIMINATION LEARNING
Hammer, M. (Indiana University, Bloomington, 1954, Thesis)
***Dissertation Abstracts*, v. 14, p. 721, 1954**

768. AN APPLICATION OF STATISTICAL LEARNING THEORY TO AN ESCAPE LEARNING SITUATION USING HUMAN SUBJECTS
Straughan, J. H. (Indiana University, Bloomington, 1954, Thesis)
Dissertation Abstracts, v. 14, p. 722, 1954

769. THE INFLUENCE OF ANXIETY AND TASK COMPLEXITY ON THE LEARNING OF CONCEPTS
Holbrook, J. D. (University of Nebraska, Lincoln, 1954, Thesis)
Dissertation Abstracts, v. 14, p. 1258, 1954

770. LEARNING THEORY AND INDUCED ANXIETY IN THE RAT
Mathers, B. L. (University of Minnesota, Minneapolis, 1954, Thesis)
Dissertation Abstracts, v. 14, p. 1263, 1954

771. LEARNING THEORY: HISTORICAL REVIEW AND RE-INTERPRETATION
Mowrer, O. H.
Harvard Educational Review, v. 24, pp. 37–58, 1954

Contemporary learning theory is examined in historical perspective which traces the parallel development of systematic formulations in terms of conditioning or sign learning and trial-and-error or solution learning, respectively. Since neither principle alone provides a comprehensive theory of learning, two basic and different processes must be recognized. In this two-factor conception the processes exist and function in an end-to-end relationship. Implications and corroborative evidence for this system are presented as they relate to: (1) the problem of punishment, (2) secondary reinforcement, (3) "reasoning" and mediational responses, (4) neurosis and therapy, and (5) social psychology. 50 references. (*PsyA*, 1955 #475)

772. MOTIVATION AND LEARNING
Mujib, A.
Indian Journal of Psychology, v. 29, pp. 115–123, 1954

Theories of learning differ from one another in their conceptions and definitions of motivation, and especially in the role which they assign it. Field theories assign it a role in the utilizing of past experience as well as a directive influence on attention, and consequently on the nature of experiences that later performances may use, though perhaps differently motivated. Other theories regard it as important in establishing a tendency for a given stimulus to produce a given response on the basis of past motivation independently of present motivation. Other possibilities are supported by other theories. (*PsyA*, 1956, #6873)

773. EFFECT OF A COMPLETELY DISSIMILAR INTERPOLATED LEARNING ON "RETROACTIVE INHIBITION"
Das, J. P.
Indian Journal of Psychology, v. 29, pp. 161–167, 1954

Experiments by Robinson and others indicate that retroactive inhibition increases, reaches a maximum, and then decreases as the quality of interpolated material varies from extreme similarity to dissimilarity. The present experiment finds that even extreme dissimilarity of an interpolated task exerts inhibition on first learning and memorized recitation of groups of auditorily presented consonants. The results support the anticonsolidation theory of retroactive inhibition. (*PsyA*, 1956, #6844)

774. TWO PROCESSES IN PERCEPTUAL LEARNING
Kilpatrick, F. P.
Journal of Experimental Psychology, v. 47, pp. 362–370, 1954

An experiment designed primarily to investigate two hypothesized perceptual learning processes, reorganizational and formative, and secondarily to test the notion that overt physical action by the learner is a necessary condition for perceptual learning. The use of monocularly distorted rooms gave "evidence that formative as well as reorganizational perceptual learning occurs. Some probable characteristics and relations of these two learning processes were discussed. The positive results from the no-action group were clearly contrary to hypothesis, and a modified formulation concerning the role of action in perceptual learning was outlined." (*PsyA*, 1955, #2154)

775. LEARNING THEORY AND IDENTIFICATION: I. INTRODUCTION
Mowrer, O. H.
***Journal of Genetic Psychology*, v. 84, pp. 197–199, 1954**

The author introduces four papers in the symposium of 1951 on learning theory and identification sponsored by the Division of Abnormal and Social Psychology of APA. (*PsyA*, 1955, #3597)

776. LEARNING THEORY AND IDENTIFICATION: III. THE DEVELOPMENT OF VALUES IN CHILDREN
Martin, W. E.
***Journal of Genetic Psychology*, v. 84, pp. 211–217, 1954**

The author discusses the development of identification of values and views the process as involving, first, the learning of behavior by imitation and reinforcement and, second, the definition of values reached inductively from observation of behavior. "Identity of values . . . is a result of identity in behavior, so acquired." (*PsyA*, 1955, #3740)

777. CRITICAL COMMENT ON "LEARNING AND THE PRINCIPLE OF INVERSE PROBABILITY"
Abelson, R. P.
***Psychological Review*, v. 61, pp. 276–278, 1954**

This paper is a criticism of a recent one by David Bakan in which the latter conveys the impression that the theorems of inverse probability are of widespread applicability to learning theory. Abelson contends that Bakan's learning theory is not a theory of the learning process in a given organism but it is a theory of the process of analyzing the learning process of an organism. The use of inverse probability in the context of learning theory is regarded as either a misrepresentation of learning theory or of inverse probability. (*PsyA*, 1955, #3574)

778. TRAUMATIC AVOIDANCE LEARNING: THE PRINCIPLES OF ANXIETY CONSERVATION AND PARTIAL IRREVERSIBILITY
Solomon, R. L. and Wynne, L. C.
***Psychological Review*, v. 61, pp. 353–385, 1954**

A highly speculative analysis of the phenomena of anxiety and avoidance learning is presented. The analysis assumes two basic acquisition processes; one for classical conditioning and one for instrumental learning. In dealing with certain of the effects found in the experimental extinction of avoidance conditioning, the principles of anxiety conservation and partial irreversibility are developed. The consequences of the analysis are discussed with an eye to both behavioral and physiological research. The paper closes with selected applications of the theory to problems in psychosomatic medicine and psychotherapy. 89 references. (*PsyA*, 1955, #5265)

779. MODERN LEARNING THEORY: A CRITICAL ANALYSIS OF FIVE EXAMPLES
Estes, W. K., et al.
Appleton-Century-Crofts, Inc., New York, N. Y., 1954

This volume contains the written reports of a seven-member seminar which met with the purpose of discussing the status and current problems of learning theory. Five theories are reviewed: Clark L. Hull by Sigmund Koch (148-item bibliography); Edward C. Tolman by Kenneth MacCorquodale and Paul E. Meehl (187-item bibliography); Burrhus F. Skinner by William S. Verplanck (64-item bibliography); Kurt Lewin by William K. Estes (18-item bibliography); and Edwin R. Guthrie by Conrad G. Mueller, Jr., and William N. Schoenfeld. 40-item bibliography. (*PsyA*, 1955, #444)

780. LEARNING: REINFORCEMENT THEORY
Keller, F. S.
Doubleday and Co., Inc., Garden City, N. Y., 1954

This booklet is "a simple and brief introduction to the reinforcement theory of learning." Fifteen sections discuss in a non-technical style such topics as operant and respondent behavior and conditioning, reinforcers, extinction, generalization, discrimination, differentiation, and chaining. (*PsyA*, 1955, #3590)

781. ON GAME-LEARNING THEORY AND SOME DECISION-MAKING EXPERIMENTS
Flood, M. M.
In "Decision Processes," Thrall, R. M., Coombs, C. H., and Davis, R. L., Editors
John Wiley & Sons, Inc., New York, N. Y., 1954, pp. 139–158

It is shown how a player can learn during the course of a sequence of plays of a game, to improve his strategy. The fusion model developed by Bush and Mosteller to explain observed behavior of rats in experimental learning situations was used as the basis for both a theoretical and experimental investigation of the efficiency of this type of learning process in learning to play games. (*PsyA*, 1955, #97)

782. A SURVEY OF MATHEMATICAL LEARNING THEORY
Bush, R. R.
October 1955
Columbia University, Bureau of Applied Social Research, New York, N. Y.
Report CU-17-55, Technical Report 12 on Behavioral Models Project, Nonr-26621
ASTIA AD-81,245

A survey is given of recent attempts to develop mathematical theories in the psychology of learning. The following concepts are discussed: stimulus and response, acquisition, experimental extinction, generalization, discrimination, motivation, punishment, and interaction processes. No attempt is made to present a systematic mathematical theory, but each concept is introduced by a brief statement of the empirical phenomenon together with a description of relevant experiments and psychological theories. Proposed mathematical models are discussed.

783. SOME PROBLEMS IN STOCHASTIC LEARNING MODELS WITH THREE OR MORE RESPONSES
Bush, R. R.
In "Mathematical Models of Human Behavior," Proceedings of a Symposium (1954), Dunlap and Associates, Inc., Stamford, Conn., 1955, pp. 22–24

In applications to specific behavioral experiments, it is necessary either: (1) to estimate all parameters αi and limit points λi from the data, or (2) to make special assumptions about the values of αi and λi. The first procedure is technically unfeasible; it was possible to estimate at most three parameters from any set of data analyzed. In all cases but one, special assumptions about the λi were made; in most cases additional assumptions about one or more of the αi were made. The concern here will be mainly with assumptions about the λi. The estimation problems are not discussed. (*PsyA*, 1956, #6517)

784. THEORY OF ELEMENTARY PREDICTIVE BEHAVIOR: AN EXERCISE IN THE BEHAVIORAL INTERPRETATION OF A MATHEMATICAL MODEL
Estes, W. K.
In "Mathematical Models of Human Behavior," Proceedings of a Symposium (1954), Dunlap and Associates, Inc., Stamford, Conn., 1955, pp. 63–67

An empirical situation of considerable interest to the learning theorist is the behavior of an individual in attempting to predict the occurrence of an uncertain event. The development of this type of behavior is of obvious practical interest, and under suitably simplified conditions the learning problem involved appears to provide an empirical bridge between the simplest forms of conditioning and more complex learning situations. The approach to the situation adopted by a number of current investigators in the Indiana Laboratory is to simplify the experimental situation so that only a few obviously essential factors are permitted to vary and then to attempt application of a theoretical model previously developed in connection with more elementary conditioning studies. (*PsyA*, 1956, #6528)

785. LEARNING
MacCorquodale, K.
***Annual Review of Psychology*, v. 6, pp. 29–62, 1955**

The reviewer approached his task with "very considerable theoretical neutrality" and found nothing to alter this. The literature reviewed is arranged by topics: drive, antecedent stimulus control, response variables, reinforcement and extinction, latent learning, and theory. 148-item bibliography. (*PsyA*, 1955, #5245)

786. A DINAMICA NERVOSA DA APRENDIZAGEM (THE NERVOUS DYNAMICS OF LEARNING)
Góes Sobrinho, F.
***Boletin do Instituto de Psicologie*,**
Rio de Janeiro, v. 5, no. 3–4, pp. 1–10, 1955

A formulation of the underlying neurological mechanism of learning is presented. According to the author, the established colloidal (cytoplasmatic) configurations,

resulting from learning, are undone, almost immediately by the chemo-electric activity of the neurone. To have a repetition of the colloidal configuration identical situations and stimuli are needed. Once the organic structures are re-made, they produce the same reactions of sensibility and suggest the previously learned behavior. (*PsyA*, 1957, #530)

787. ALGUMAS NOTAS SOBRE OS FUNDAMENTOS DA TEORIA GESTALTISTA DA APRENDIZAGEM (SOME NOTES ABOUT THE FUNDAMENTALS OF THE GESTALT THEORY OF LEARNING)
Gomes Penna, A.
***Boletim do Instituto de Psicologie*,**
Rio de Janeiro, v. 5, no. 5–6, pp. 1–4, 1955

The integrative function of Gestalt theory has been put to work in the area of learning by Wertheimer in distinguishing between meaningless and meaningful situations. Learning in meaningless situations will follow the repetition model favored by behaviorists; while learning in meaningful situations will follow the insight model more favored by the Gestalt school itself. (*PsyA*, 1957, #531)

788. AVOIDANCE LEARNING OF PERCEPTUAL DEFENSE AND VIGILANCE
Dulany, D. E., Jr. (University of Michigan, Ann Arbor, 1955, Thesis)
***Dissertation Abstracts*, v. 15, pp. 625–626, 1955**

789. THE RELATION OF OVERT ERRORS DURING LEARNING TO TRANSFER AND RETROACTIVE INHIBITION
Morrow, M. A. (Washington University, St. Louis, Mo., 1954, Thesis)
***Dissertation Abstracts*, v. 15, p. 887, 1955**

790. A TEST OF INTERFERENCE VS. DRIVE INCREMENT THEORY OF THE INFLUENCE OF ANXIETY UPON LEARNING
Nicholson, W. M. (University of Pennsylvania, Philadelphia, 1955, Thesis)
***Dissertation Abstracts*, v. 15, pp. 887–888, 1955**

791. LEVELING AND SHARPENING AS MANIFESTED IN DISCRIMINATION LEARNING, THRESHOLD AND PROBLEM SOLVING BEHAVIOR
Deutscher, C. (New York University, N. Y., 1955, Thesis)
***Dissertation Abstracts*, v. 15, p. 1656, 1955**

792. CUE AND CONTEXTUAL STIMULUS INTENSITY IN DISCRIMINATION LEARNING
Nygaard, J. E. (University of Illinois, Urbana, 1955, Thesis)
***Dissertation Abstracts*, v. 15, p. 2315, 1955**

793. TRAUMATIC AVOIDANCE LEARNING: ACQUISITION AND EXTINCTION IN DOGS DEPRIVED OF NORMAL PERIPHERAL AUTONOMIC FUNCTION
Wynne, L. C. and Soloman, R. L.
***Genetic Psychology Monographs*, v. 52, pp. 241–284, 1955**

Thirteen dogs who were given surgical-drug treatment before training showed less uniform behavior than the controls in both acquisition and extinction, were often retarded in learning to escape the shock, and evidenced some spontaneous extinction (not present in any of the normal animals). Two dogs who were given surgical drug treatment after training showed no behavioral effects during the extinction phase of the experiment. "These results are discussed in terms of a two-process theory of learning and the parallel function of at least four physiological systems which are highly activated in the presence of relatively intense, noxious stimuli." 28 references. (*PsyA*, 1956, #6886)

794. STUDIES IN THE NEUROPHYSIOLOGY OF LEARNING: II. EFFECT OF BRAIN STIMULATION DURING BLACK-WHITE DISCRIMINATION ON LEARNING BEHAVIOR IN THE WHITE RAT
Gengerelli, J. A. and Cullen, J. W.
***Journal of Comparative and Physiological Psychology*, v. 48, pp. 311–319, 1955**

By means of implanted electrodes, rats were given cerebral stimulation at one of two differing frequencies (75/sec or 300/sec) while engaged in learning of a black-white discrimination problem. Normal and operate control groups were also run. While differences between the groups were small, the cumulative ratio of correct to incorrect choices indicated a significant acceleration of learning rate, most marked with the higher stimulus frequency. Findings are discussed in relation to the assumption that learning is a function of frequency and duration of nerve impulse volleys. (*PsyA*, 1956, #4115)

795. THE ROLE OF IRRELEVANT STIMULI IN HUMAN DISCRIMINATION LEARNING
Hammer, M.
Journal of Experimental Psychology,
v. 50, pp. 47–50, 1955

The purpose of the present experiment was to determine whether S learns not to attend to the irrelevant stimuli during discrimination training. The S was presented successively with two discrimination problems. A transfer of training design was used. . . . The transfer of irrelevant stimuli from the first problem to the second problem did not significantly affect S's performance on the second problem and there was no evidence that responses of any sort were acquired to the irrelevant stimuli during discrimination training. (*PsyA*, 1956, #2370)

796. APPLICATION OF A STATISTICAL MODEL TO SIMPLE DISCRIMINATION LEARNING IN HUMAN SUBJECTS
Estes, W. K. and Burke, C. J.
Journal of Experimental Psychology,
v. 50, pp. 81–88, 1955

Ss had to predict which of a pair of reinforcing lights would appear following a signal. "Uniform reinforcement (conditioning phase) or nonreinforcement (extinction phase) was given in the presence of one stimulus set and 50 percent random reinforcement in the presence of the other. . . . Correspondences of theory and data, although by no means perfect, tended to support the view that discrimination learning in this situation is a simple resultant of effects of reinforcement and nonreinforcement." (*PsyA*, 1956, #4111)

797. CONCEPT FORMATION: A PROBLEM IN HUMAN OPERANT CONDITIONING
Green, E. J.
Journal of Experimental Psychology,
v. 49, pp. 175–180, 1955

An investigation was made of the roles played in concept formation by fixed-ratio schedules of reinforcement and by the length of time the discriminative stimuli are presented to the S. The extent to which Ss discriminated was inversely related to the ratio of responses to reinforcement and directly to the length of time the stimuli were presented during conditioning. (*PsyA*, 1956, #585)

798. DISCRIMINATION OF COMPLEX STIMULI: THE RELATIONSHIP OF TRAINING AND TEST STIMULI IN TRANSFER OF DISCRIMINATION
Kurtz, K. H.
Journal of Experimental Psychology,
v. 50, pp. 283–292, 1955

"From a theoretical analysis of discrimination learning in terms of implicit observing responses it was predicted that transfer of discrimination training from one task to a second task would be positive when the stimuli employed were distinguished by the same property in both tasks, and that transfer would be negative when the stimuli were distinguished by different properties in the two tasks." The results of this study confirmed these predictions. (*PsyA*, 1956, #5703)

799. FACTORS INFLUENCING RATE AND EXTENT OF LEARNING IN THE PRESENCE OF MISINFORMATIVE FEEDBACK
Morin, R. E.
Journal of Experimental Psychology,
v. 49, pp. 343–351, 1955

Groups of Ss were given various degrees of misinformative feedback in a two-choice response situation. The groups were also classified in terms of the instructions utilized and the presence or absence of a correction signal. It was found that the S's ability to filter out misinformative feedback and acquire optimum response solutions was a decreasing function of the percentage of misinformative feedback. It was also found that awareness

of the possibility of misinformative feedback, a correction signal in the feedback channel, and an explanation of the function of this signal are all important to learning: each new addition results in significantly better performance. (*PsyA*, 1956, #544)

800. TOWARD SOME INTEGRATION OF LEARNING THEORIES: THE CONCEPT OF OPTIMAL STIMULATION

Leuba, C.

***Psychological Reports*, v. 1, pp. 27–33, 1955**

The purpose is to provide a general outline of the concept of optimal stimulation and to show that it has some backing both from experiments and general observations, that it may bridge the gap between a modified reinforcement theory and classical conditioning, and that it is consequently worth serious consideration. The paper raises many problems such as that concerned with determination of what will be optimal stimulation in a given situation. (*PsyA*, 1956, #2377)

801. THE PITUITARY-ADRENOCORTICAL SYSTEM IN AVOIDANCE LEARNING

Applezweig, M. H. and Baudry, F. D.

***Psychological Reports*, v. 1, pp. 417–420, 1955**

Two studies are reported comparing the performance of hypophysectomized and intact rats in avoidance conditioning. The hypothesis that an intact pituitary-adrenal system is necessary for avoidance learning was not confirmed, although it was found that interruption of this system (by hypophysectomy) did interfere with the acquisition of avoidance responses, and sham-restoration of the system by exogenous administration of ACTH appeared to improve conditioning somewhat. (*PsyA*, 1956, #5671)

802. A THEORY OF DISCRIMINATION LEARNING

Restle, F.

***Psychological Review*, v. 62, pp. 11–19, 1955**

This paper presents a theory of two-choice discrimination learning. Though similar in form to earlier theories of simple learning by Estes and Bush and Mosteller, this system introduces a powerful new assumption which makes definite quantitative predictions easier to obtain and test. Several such predictions dealing with learning and transfer are derived from the theory and tested against empirical data. (*PsyA*, 1955, #8397)

803. THE STIMULUS CONDITIONS WHICH FOLLOW LEARNED RESPONSES

Perkins, C. C., Jr.

***Psychological Review*, v. 62, pp. 341–348, 1955**

An analysis of the stimulus conditions which immediately follow occurrences of the response acquired or extinguished is presented. It is assumed that any stimulus-response connections which become stronger are followed by a more reinforcing stimulus situation than alternate responses which tend to drop out. The analysis leads to a different treatment of conditioning than that found in reinforcement, contiguity, or two-factor approaches. The analysis leads to a clarification of the differences between trial and error learning and conditioning and at the same time implies common principles underlying both. The article concludes with an analysis of the development of observing responses and suggestions for experimental test of the theory. 20 references. (*PsyA*, 1956, #4131)

804. STATISTICAL THEORY OF DISTRIBUTIONAL PHENOMENA IN LEARNING

Estes, W. K.

***Psychological Review*, v. 62, pp. 369–377, 1955**

An analysis of the distributional problem in learning reveals that the variables of stimulus fluctuation and interpolated learning are most ubiquitous in influence. A mathematical model developed around the concept of stimulus fluctuation allows for an account of a wide variety of experimental findings without resort to any sort of neo-Pavlovian conceptions of inhibitory potential. 25 references. (*PsyA*, 1956, #4110)

805. ASSOCIATION THEORY AND PERCEPTUAL LEARNING

Postman, L.

***Psychological Review*, v. 62, pp. 438–446, 1955**

Two contrasting approaches to the problem of perceptual learning have been examined—traditional associationism and the specificity hypothesis of Gibson and

Gibson, which ascribes all perceptual learning to the increasing effectiveness of stimulus variables. The case for the associationistic position has been reaffirmed, and the adequacy of the specificity formulation has been questioned. (*PsyA*, 1956, #5713)

806. AXIOMS OF A THEORY OF DISCRIMINATION LEARNING

Restle, F.
***Psychometrika*, v. 20, pp. 201–208, 1955**

Analysis of an empirical theory into a formal system with specified primitive notions and axioms has the advantage of making it clear what deductions from the theory are permissible, and clarifying the internal structure of the theory. An example of such analysis is presented in this paper. (*PsyA*, 1956, #4137)

807. STOCHASTIC MODELS FOR LEARNING

Bush, R. R. and Mosteller, F.
John Wiley & Sons, Inc., New York, N. Y., 1955

The basic model, stimulus sampling and conditioning, sequences of events, distributions of response probabilities, the equal alpha condition, approximate methods, operators with limits zero and unit, commuting operators, identification and estimation, free-recall verbal learning, avoidance training, an experiment of imitation, symmetric choice problems, runway experiments and evaluations are discussed. Tables, graphs, and formulae are included. (*PsyA*, 1956, #2349)

808. THE ROLE OF CLASS-DESCRIPTIVE CUES IN PAIRED-ASSOCIATES LEARNING

Wulff, J. J. and Stolurow, L. M.
February 10, 1956
Illinois, University of, Training Research Lab., Urbana
Report, AFPTRC TN-57-80, AF 33(038)25726
ASTIA AD-131,432

It was postulated that the stimulus unit represented by S in the associative paradigm can be usefully described as: (1) an "implicit" response to features of the stimulus object, (2) an event with stimulus properties, and (3) a modifiable event rather than one that is fixed by the stimulus object. It was hypothesized that when the stimulus objects in a list of objects have class-descriptive features, these features may give rise to implicit responses which become a part of the associative-stimulus event. In this case the associative-stimulus event is said to be compounded of implicit responses to class-descriptive cues and item-descriptive cues. The utility of this conception of the stimulus unit was tested by comparing the rate of paired-associates learning for a given task under two different conditions of training. The paired-associates task was one for which learning was expected to be facilitated if combinations of implicit responses to class and item cues functioned as the stimulus events. Two training conditions were selected so that one would favor the formation of such compound stimulus events, the other would not. The training condition which favored the use of combinations of cues resulted in a reliably higher level of performance with a given amount of training.

809. A GRAPHICAL DESCRIPTION OF ROTE LEARNING

Underwood, B. J.
August 27, 1956
Northwestern University, Evanston, Ill.
N7onr-45008
ASTIA AD-138,972

It has long been known that group learning curves do not reflect the oscillations present in the learning records of the individual S. A way of coordinating these oscillations for a group of Ss is presented for rote-learning data. The resulting graph shows systematic cycles in the performance curve.

810. ELECTRICAL SIMULATION OF SOME NERVOUS SYSTEM FUNCTIONAL ACTIVITIES

Taylor, W. K.
Proceedings of the Third Symposium on Information Theory, Royal Institution, London, September 12–16, 1955
In "Information Theory," Cherry, C., Editor, Academic Press, New York, N. Y., 1956, pp. 345–353

An electronic model of associate learning is discussed.

811. A COMPARISON OF THREE MODELS FOR A HUMPHREYS-TYPE CONDITIONING SITUATION
Atkinson, R. C.
November 20, 1956
Stanford University, Applied Mathematics and Statistics Lab., Calif.
Technical Report 5, Nonr-22517
ASTIA AD-114,525

Three models for a Humphreys-type conditioning situation are presented. In Model I experimental trials are viewed as discrete units, and the possible influence of trace stimuli on behavior is not considered. Models II and III are members of a class of representations which incorporates a concept of trace stimuli as determining components of subsequent behavior. Functions expressing the expected probabilities of responses are derived and predictions for the three models compared.

812. INTRODUCTORY STATEMENT AND A REVIEW OF RELATED WORK AND OF THE STUDIES OF THE FIRST EIGHTEEN MONTHS
Cofer, C. N.
1956
Maryland University, College Park
Technical Report 1 on Learning, Retention and Recovery of Meaningful Material, Nonr-59504
ASTIA AD-112-157

813. DEVELOPMENT AND LEARNING IN ANIMALS AND MAN
Salman, D. H.
***American Journal of Psychiatry*, v. 112, p. 935, 1956**

814. PRESENT ACCOMPLISHMENT AND FUTURE TRENDS IN PROBLEM-SOLVING AND LEARNING THEORY
Melton, A. W.
***American Psychologist*, v. 11, pp. 278–281, 1956**

One obvious criticism of what has happened in the last 25 years is the domination of theories of learning by the rat. It is predicted that there will be a social revolution among students of learning wherein man reestablishes his dominance over the rat. The prediction is a frontal attack on the problem of achieving a descriptive schema for identifying samples of human learning, and for identifying primary task variables. The notion "must be overcome" that the stimulus is a simple punctiform affair . . . that can be dealt with as though it occurred without context. (*PsyA*, 1957, #5723)

815. LEARNING
Estes, W. K.
***Annual Review of Psychology*, v. 7, pp. 1–38, 1956**

A review is given for the period May 1954 to 1955 of the literature on learning with a selection of contributions which "exemplify the major contemporary trends in the development of learning theory and its interplay with empirical research." Major divisions are: theories and models, reinforcement and extinction, drive, S-*R* analysis of human learning, retention and transfer, and learning theory and related disciplines. 194-item bibliography. (*PsyA*, 1956, #5685)

816. THE STATISTICAL ANALYSIS OF THE LEARNING PROCESS. II. STOCHASTIC PROCESSES AND LEARNING BEHAVIOR
Audley, R. J. and Jonckheere, A. R.
***British Journal of Statistical Psychology*, v. 9, pp. 87–94, 1956**

This paper examines the advantages to be gained from a probabilistic analysis of learning behavior, and presents a simple conceptual scheme from which are derived a number of stochastic processes suitable for this purpose. An endeavor is made to clarify the problems of estimation and goodness of fit which arise when such processes are fitted to experimental data. (*PsyA*, 1958, #1962)

817. A THEORY OF INSIGHT, REASONING AND LATENT LEARNING
Deutsch, J. A.
***British Journal of Psychology*, v. 47, pp. 115–125, 1956**

The results of various experiments on insight, reasoning, and latent learning are examined in terms of the author's theory of learning and performance under goal seeking conditions which is reviewed in brief. 25 references. (*PsyA*, 1957, #4286)

818. DISCRIMINATION LEARNING AS A FUNCTION OF DRIVE LEVEL AND CUE SIMILARITY
Steinschneider, A. (Cornell University, Ithaca, N. Y., 1955, Thesis)
Dissertation Abstracts, v. 16, pp. 391–392, 1956

819. NEGATIVE TRANSFER AND RETROACTIVE INHIBITION IN CONCEPT AND PAIRED ASSOCIATE LEARNING AS A FUNCTION OF STIMULUS SIMILARITY BETWEEN ORIGINAL AND INTERPOLATED TASKS
Loper, J. S. (Ohio State University, Columbus, 1955, Thesis)
Dissertation Abstracts, v. 16, p. 565, 1956

820. EFFECT OF FIRST-ORDER CONDITIONAL PROBABILITY IN A TWO-CHOICE LEARNING SITUATION
Anderson, N. H. (University of Wisconsin, Madison, 1956, Thesis)
Dissertation Abstracts, v. 16, pp. 2217–2218, 1956

821. A THEORY OF LEARNING AND ITS APPLICATION TO A CLASS IN COLLEGE MATHEMATICS
Williamson, R. G. (University of Maryland, College Park, 1956, Thesis)
Dissertation Abstracts, v. 16, p. 2411, 1956

822. THE APPLICATION OF FACTOR-ANALYSIS TO PROBLEMS OF LEARNING
Mukherjee, B. M.
Indian Journal of Psychology, v. 31, pp. 83–93, 1956

Factor-analytic studies of learning are more efficient than the univariate experimental investigation. They should precede and guide studies of this sort as well as analysis-of-variance studies. Factor-analytic studies made thus far have already shown that learning ability is not unitary, and have shown a number of factors and their patterns of interaction in various learning situations. Much work of this kind remains to be done. (*PsyA*, 1958, #5149)

823. INTERRELATIONSHIPS OF SUCCESSIVE AND SIMULTANEOUS DISCRIMINATION
North, A. J. and Jeeves, M. A.
Journal of Experimental Psychology, v. 51, pp. 54–58, 1956
ASTIA AD-115,465

An experiment was designed to test Spence's three-level theory of discrimination learning and Lawrence's hypothesis of the acquired distinctiveness of cues. In contrast to Spence's theory a multiordinal one was proposed which appeared to account for the results of this experiment. This hypothesis states that all orders of functional stimulus unit—elements, compounds, transverse patterns, etc.—concurrently acquire response tendencies. In light of these findings and analysis no definite statement regarding Lawrence's hypothesis could be made. (*PsyA*, 1956, #6876)

824. SPONTANEOUS RECOVERY AND STATISTICAL LEARNING THEORY
Homme, L. E.
Journal of Experimental Psychology, v. 51, pp. 205–212, 1956

"Investigations are reported of the theoretical and empirical relationships between spontaneous recovery from extinction and (1) number of reinforcements and (2) spacing of acquisition. The experiments utilized albino rats in a Skinner-type conditioning situation." In the main, the predictions from statistical theory were verified. However, it was noted that better quantitative accounts of the data could be obtained if the assumption that all elements in the stimulus population fluctuate randomly in and out of the effective stimulating situation were modified to allow for a common core of stimulus elements which remain fixed while the remainder of the population fluctuates randomly. (*PsyA*, 1957, #2432)

825. "BACKWARD" LEARNING IN PAIRED ASSOCIATES
Murdock, B. B., Jr.
Journal of Experimental Psychology, v. 51, pp. 213–215, 1956

An attempt is made to determine whether in learning *A–B*, *B–A* is also learned. It was found that after learning *A–B*, Ss showed positive transfer in learning *B–A* and negative transfer in learning "scrambled" pairs of *B–A*. It is concluded that backward learning does occur, but that the term "backward" may not be an appropriate one. (*PsyA*, 1957, #2460)

826. STUDIES IN INCIDENTAL LEARNING: III. INTERSERIAL INTERFERENCE
Postman, L. and Adams, P. A.
***Journal of Experimental Psychology*, v. 51, pp. 323–328, 1956**

A study of retroactive inhibition (*RI*) and associative inhibition (*AI*) as a function of intentional and incidental conditions. Intentional interpolated learning (*IL*) produced more *RI* than incidental *IL*. *AI* was significant only when both lists were learned intentionally. With intentional practice during interpolation more items were learned and thus a more effective interference. (*PsyA*, 1957, #4325)

827. DISCRIMINATION LEARNING AS A FUNCTION OF REVERSAL AND NONREVERSAL SHIFTS
Kelleher, R. T.
***Journal of Experimental Psychology*, v. 51, pp. 379–384, 1956**

The first experiment reported is a comparison of reversal and nonreversal shifts: the second eliminates the partial reinforcement following a nonreversal shift. In Experiment I it was found that the nonreversal shift was accomplished more readily than the reversal shift. In Experiment II it was found that the reversal group was retarded. The results are interpreted as supporting the single-unit *S-R* theory of Spence, while being inconsistent with the sequential *S-R* theory of Lawrence. 11 references. (*PsyA*, 1957, #4308)

828. IRRELEVANT OR PARTIALLY CORRELATED STIMULI IN DISCRIMINATION LEARNING
Jeeves, M. A. and North, A. J.

Further data on the continuity-noncontinuity theories of discrimination learning. It is found that an irrelevant stimulus does not necessarily interfere with learning to discriminate a critical stimulus, nor does its previous irrelevance subsequently affect its discrimination as a critical stimulus. A stimulus partially correlated with the critical stimulus does not necessarily interfere with or enhance learning to discriminate a critical stimulus, and subsequent discrimination of such a stimulus depends on whether it has been more often positive or negative. These data appear to favor the continuity theory of discrimination learning. (*PsyA*, 1957, #5706)

829. EXPERIMENTS ON PERCEPTUAL INTEGRATION IN ANIMALS
Sperry, R.
***Psychiatric Research Reports*, no. 6, pp. 151–160, 1956**

An "over-all glimpse" of current studies of the mechanisms underlying perception, perceptual learning, and perceptual memory is given. Evidence from animal studies (cats) does not support the Gestalt-oriented "electrical field theory of cerebral integration." "Perceptual learning and memory thus seem to proceed quite independently in the two hemispheres in the absence of the callosum"... even though the learning process "in the two separated hemispheres is remarkably similar in character as judged by the close matching of the learning curves for the two hemispheres." On-going studies with the "split brain preparation" are also described. (*PsyA*, 1958, #117)

830. ABSOLUTE AND RELATIONAL STIMULUS TRAINING IN DISCRIMINATION LEARNING
Lachman, S. J.
***Psychological Monographs: General and Applied*, No. 412, v. 70, no. 5, 1956**

Using a method by which stimulus control was considerably greater than has been usual in discrimination research, the author sought to obtain evidence regarding the relative efficacy of relational versus absolute stimulus-training techniques in the discriminational learning of rats. Four groups of female, albino rats of approximately the same age were placed in a modified Yerkes-type brightness discrimination apparatus where each was exposed to brightness stimuli of varying intensity. The results attained appear to "support the Gestalt concept, i.e., that discrimination is based upon the 'comparative' (or relational) aspects of the immediate component stimuli of the configuration, and that training upon the component stimuli separately is inadequate." 20 references. (*PsyA*, 1957, #4313)

831. AFFECT AND PERCEPTUAL LEARNING
Murphy, G.
***Psychological Review*, v. 63, pp. 1–15, 1956**

Of the many hypothesized effects of affect on the perceptual processes, the author selects the one relating to its influences on perceptual learning. The only

aspect of affectivity considered here is the pleasantness–unpleasantness dimension. The discussion is set in the context of a variety of researches and theories. 32 references. (*PsyA*, 1957, #2461)

832. TWO-FACTOR LEARNING THEORY RECONSIDERED, WITH SPECIAL REFERENCE TO SECONDARY REINFORCEMENT AND THE CONCEPT OF HABIT

Mowrer, O. H.
***Psychological Review*, v. 63, pp. 114–128, 1956**

Two-factor learning theory is re-examined in the light of research on secondary reinforcement and the proprioceptive control of behavior. The result is a modification of the position which makes it more compatible with field-type theories than before. The concept of habit is given a new meaning which makes it more like positive feedback than a motive-behavior bond. The article concludes with some criticisms of the position and possible resolutions of them. (*PsyA*, 1957, #2459)

833. THE PSYCHOLOGY OF LEARNING

Bugelski, B. R.
Henry Holt & Co., Inc., New York, N.Y., 1956

834. LEARNING, PROBLEM-SOLVING, AND AFTER-EFFECTS

Faltheim, A.
Appelbergs Boktryckeri, Uppsala, Sweden, 1956

The role of aftereffects (reward and punishment) in simple and complex, human and animal learning is critically examined and further data in this area provided by a number of experiments performed by the author. Although an attempt is made to keep theorizing to a minimum, the implications of this research for learning without awareness, Muenzinger's sensitization hypothesis, latent learning, S-S versus S-*R* theories, etc., is briefly noted. Emphasizes the qualitative differences in various types of learning often classed as similar as well as the need for considering intent, attention, consciousness and attitude in learning research. 216 references. (*PsyA*, 1957, #2415)

835. THEORIES OF LEARNING

Hilgard, E. R.
Appleton-Century-Crofts, New York, N.Y., 1956 (Second Edition)

The second edition (see *PsyA*, 1948, #2940) has been enlarged by one third. To the chapters on learning theorists dealt with in the first edition have been added chapters on learning implications of Freud's psychodynamics, mathematical models, and two chapters exploring current developments in learning theory which have not yet matured. Some materials, e.g., the chapter on Wheeler, have been omitted and all material has been rewritten with major reorganization. 59-page bibliography. (*PsyA*, 1956, #8099)

836. CONDITIONAL PROBABILITY AS A PRINCIPLE IN LEARNING

Uttley, A. M.
Namur Cybernetics Conference, Gauthier-Villars, Paris, 1956

837. CONDITIONED REINFORCING AND AVERSIVE STIMULI IN AN AVOIDANCE SITUATION

Sidman, M., Herrnstein, R. J., and Boren, J. J.
April 1957
Walter Reed Army Institute of Research, Washington, D.C.
Interim Report on Comparative Experimental Analysis of Behavior Under Stress, WRAIR 54-57
ASTIA AD-151,632

Experiments were performed to elucidate the functions of the warming stimulus in avoidance behavior. A stimulus was defined as relatively reinforcing when the animal's behavior was such as to maintain the stimulus once it appeared and to regain the stimulus as quickly as possible after it was terminated. A stimulus was defined as relatively aversive when the animals behaved in such a way as to terminate the stimulus as quickly as possible and to postpone the onset of the stimulus. The conception of avoidance behavior that is based upon the relative reinforcing functions imparted to stimuli by alternative avoidance contingencies was induced and supported by

means of a number of experimental operations. The operant consequences of the avoidance response determined the function of the warning stimulus.

838. STIMULUS AND RESPONSE GENERALIZATION. DEDUCTION OF THE GENERALIZATION GRADIENT FROM A TRACE MODEL

Shepard, R. N.
December 17, 1957
Harvard University, Psycho-Acoustic Lab., Cambridge, Mass.
Report, AFCRC TN-57-62, AF 33(038)14343
ASTIA AD-146,753

Measures of generalization can be defined in terms of the conditional probabilities with which the various stimuli lead to the various responses. Thus defined, stimulus generalization and response generalization are both invariant functions of interstimulus and interresponse dissimilarities, respectively, provided that two conditions are met. First, dissimilarity is reinterpreted to mean a psychological distance which: (a) is equivalent to physical distance except for a continuous, differentiable transformation, and (b) satisfies the metric axioms. Second, a given schedule of reinforcement is maintained. Under conditions of frequent and regular reinforcement (as in the typical paired-associate experiment), the gradient of generalization is closely approximated by an exponential decay function (concave upward). Under conditions of infrequent or intermittent reinforcement, this gradient departs from the exponential function in that it is convex upward in the vicinity of the reinforced stimulus or response. The empirically observed gradients of generalization can be deduced from a mathematical model based upon four elementary assumptions concerning the temporal decay of stimulus and response traces.

839. LEARNING

Walker, E. L.
***Annual Review of Psychology*, v. 8, pp. 113–138, 1957**

At least four major trends which became apparent between April, 1955 and April, 1956 are considered under the following headings: Mathematical Models and Learning, Neurophysiological Variables and Learning, Systematic Issues, Motivation and Reward, Perceptual Learning, Verbal Learning, Social Learning, and Conditioning. 161-item bibliography. (*PsyA*, 1958, #253)

840. THE FORMALIZATION OF SCIENTIFIC LANGUAGES: I. THE WORK OF WOODGER AND HULL

Dunham, B.
***IBM Journal of Research and Development*, v. 1, pp. 341–348, 1957**

The extent to which scientific languages can be formalized is critical to the assumption that a theory proving machine will deal most effectively with formal systems. In Part I, the axiomatic attempts of Woodger in genetics and of Hull in the theory of rote learning are examined. The same criticism is made of both theories, i.e., that the formalized area of theory is too heavily dependent on other unformalized areas. Hull's work is also challenged for having been molded too rigidly into a preconceived pattern. (*PsyA*, 1959, #3115)

841. STATISTICAL LEARNING THEORY APPLIED TO AN INSTRUMENTAL AVOIDANCE SITUATION WITH HUMAN SUBJECTS

Brody, A. L. (Indiana University, Bloomington, 1956, Thesis)
***Dissertation Abstracts*, v. 17, p. 412, 1957**

842. TRANSMISSION OF LEARNED BEHAVIOR BETWEEN RATS

Church, R. M.
***Journal of Abnormal and Social Psychology*, v. 54, pp. 163–165, 1957**

Six rats were trained to follow leader rats in an elevated *T* maze to secure a reward of water. An incidental cue of two lights was then introduced such that the leaders responded consistently with respect to it. After 100 trials of following leaders who were responding to the incidental cue, Ss were given 20 trials alone. On 77 percent of these test trials Ss went to the arm marked by the cue to which the leader had been going. This finding was interpreted as a demonstration of transmission of learned behavior between animals, and it was explained on the basis of a continuity theory of discrimination learning. (*PsyA*, 1959 #5560)

843. LEARNING THEORY AND "OPPOSITE SPEECH"
Staats, A. W.
Journal of Abnormal and Social Psychology, v. 55, pp. 268–269, 1957

A description is given of the "opposite speech" symptom in schizophrenia in terms of learning theory. (*PsyA*, 1959, #3215)

844. A TEST OF A STATISTICAL LEARNING THEORY MODEL FOR TWO-CHOICE BEHAVIOR WITH DOUBLE STIMULUS EVENTS
Anderson, N. H. and Grant, D. A.
Journal of Experimental Psychology, v. 54, pp. 305–317, 1957

This paper reports a model for two-choice predicting behavior, and three experiments which evaluate the model. The model is based on statistical learning theory, being an extension of the Estes-Burke-Straughan model to the case where either response alone (single events), both responses, or neither response (double events) may be correct in any given trial. . . . The model should be useful in predicting mean performance over a fairly wide range of stimulus conditions but that it is inadequate to handle response distributions or conditional probabilities in its present form. (*PsyA*, 1959, #3082)

845. THE APPLICATION OF DIMENSIONAL ANALYSIS TO LEARNING THEORY
Menkes, A. and Menkes, J.
Psychological Review, v. 64, pp. 8–13, 1957

The method of dimensional analysis is presented and its uses as a method of combining variables into functional relationships by analytical considerations, as a way of discovering new variables, and as a tool for scaling were discussed. Some variables of the psychology of learning were dimensionalized and analyzed by means of the above methods. These considerations yielded a number of predictions, one of which was subjected to a preliminary test. The results were as predicted. (*PsyA*, 1958, #237)

846. DISCRIMINATION LEARNING THEORY: UNIPROCESS VS. DUOPROCESS
Harlow, H. F. and Hicks, L. H.
Psychological Review, v. 64, pp. 104–109, 1957

847. THE CELL ASSEMBLY: MARK II
Milner, P. M.
Psychological Review, v. 64, pp. 242–252, 1957

This deals with a neural model, similar to Hebb's, that is based on "association-of-ideas." "Thus, one principle of learning—the binding of cells into a group by repeated simultaneous firing—fulfills a double role; when the newly added cells are predominantly primed by sensory input perceptual learning results; and when the new cells are primed by the firing of another cell assembly, associative learning results." (*PsyA*, 1959, #249)

848. A COMPONENT MODEL FOR STIMULUS VARIABLES IN DISCRIMINATION LEARNING
Burke, C. J. and Estes, W. K.
Psychometrika, v. 22, pp. 133–145, 1957

A general function is derived describing the conditioning of a single stimulus component in a discriminative situation. This function, together with the combinatorial rules of statistical learning theory . . . generates empirically testable formulas for learning of classical two-alternative discriminations, probabilistic discriminations, and discriminations based on the outcomes of preceding trials in partial reinforcement experiments. (*PsyA*, 1959, #627)

849. MARKOV PROCESSES IN LEARNING THEORY
Kemeny, J. G. and Snell, J. L.
Psychometrika, v. 22, pp. 221–230, 1957

Consideration is given mathematical problems arising in two learning theories—one developed by Bush and Mosteller leads to a class of Markov processes which have been studied in considerable detail. (*PsyA*, 1959, #674)

850. A STOCHASTIC DESCRIPTION OF THE LEARNING BEHAVIOUR OF AN INDIVIDUAL SUBJECT
Audley, R. J.

Quarterly Journal of Experimental Psychology, v. 9, pp. 12–20, 1957

A stochastic process for the description of learning behavior in a two-choice situation, a special case of a family of processes given in an earlier paper, is introduced. It can be used to describe individual learning data, including both the choice sequence and the latency of the choices within the description . . . the process is fitted to fifty learning trials of an albino rat. (*PsyA*, 1958, #1272)

851. THE DYNAMICS OF ANXIETY AND HYSTERIA; AN EXPERIMENTAL APPLICATION OF MODERN LEARNING THEORY TO PSYCHIATRY
Eysenck, H. J.
Frederick A. Praeger, Inc., New York, N. Y., 1957

This book is an attempt to go beyond descriptive aspects of abnormal behavior to a study of its dynamics from the point of view of modern learning theory as developed specially by Pavlov and Hull. In the first chapter the author reviews his previous work in the nosology or taxonomy of mental disturbances. Remaining chapters are devoted to such problems as learning theory and human behavior, personality and learning theory, personality and perceptual processes, socialization and personality, drugs and personality, psychological theory and psychiatric practice. 26-page bibliography. (*PsyA*, 1958, #1752)

852. THE EFFECTS OF RATE AND DIRECTION OF CONDITIONED STIMULUS CHANGE ON AVOIDANCE PERFORMANCE
Schwartz, M. and Goodson, J. E.
May 15, 1958
Naval School of Aviation Medicine, Pensacola, Fla.
Report 4, Project NM 14 02 11
ASTIA AD-202,350

It has been reported that an on-going condition stimulus (*CS*) is more effective for avoidance responding than an off-going *CS*. This experiment further tests the effects of direction of *CS* change and tests for interaction between rate and direction of *CS* change. Rats were employed as Ss. The *CS* was an on- or off-going light and it changed fast or slow. All Ss searched 80 percent avoidance responding during training. During extinction they were split according to a factorial design. It was concluded that avoidance performance is independent of direction of *CS* change, and rate and direction of change probably do not interact.

853. THE MEASUREMENT OF LEARNING
DuBois, P. H. and Manning, W. H., Editors
May 1958
Washington University, St. Louis, Mo.
TR 6, Nonr-81602
ASTIA AD-160,518

A report of a conference held at University of Washington February 27, 1958, covered the following subjects: An Application of a New Nonmetric Model for the Multidimensional Analysis of Similarities, by C. H. Coombs; Problems Arising From the Unreliability of the Measuring Instrument, by F. M. Lord; A Rational Analysis of Typical Learning Measures, by I. Guttman; Measurement of Learning in Extensive Training Programs, W. B. Webb.

854. LEARNING PARAMETERS, APTITUDES, AND ACHIEVEMENTS
Stake, R. E.
June 1958
Princeton University, N. J.
Technical Report on Mathematical Techniques in Psychology, Nonr-185815
Thesis
ASTIA AD-208,485

The individual differences in certain learning performances were investigated with particular reference to measures of various mental abilities and achievements. The study revealed no general learning ability other than the general aptitude that is measured by such tests as an intelligence test given just once. Added incentive, one of the design variables, had universal rather than individual effect: the same learners excelled regardless of the incentive provided. The association of one of the learning factors with a group of numerical tasks supports the hypothesis that learning ability can be specific to a type of task. No factors were found to support the hypothesis that a rote learning performance is fundamentally different from a relational learning performance.

855. A LINEAR LEARNING MODEL FOR A CONTINUUM OF RESPONSES

Suppes, P.
October 18, 1958
Stanford University, Applied Mathematics and Statistics Lab., Calif.
TR 19, Nonr-22517
ASTIA AD-206,063

An investigation is presented to formulate and analyze a linear model for simple learning with a continuum of responses. The analogous mode for a finite number of responses was extensively studied both experimentally and mathematically (AD-149,728). The experimental situation consists of a sequence of trials. On each trial the subject (of the experiment) makes a response, which is followed by a reinforcing event indicating the correct response for that trial. For the theory considered, the relevant data on each trial may be represented by an ordered pair (x, y) of numbers. The number x represents the response and y the reinforcement. In the finite case of two responses and two reinforcements, x and y are either 0 or 1. (The phrases finite case and finite model refer to the linear model for a finite number of responses; and the phrases continuous case and continuous model to the linear model for a continuum of responses). The psychological basis of the finite and continuous models is the same, namely, the fundamental postulate that in a simple learning situation with the same stimulus presentation on each trial, systematic changes in response behavior are determined by the experimental conditions of reinforcement.

856. A REVIEW OF FACTORS IN LEARNING EFFICIENCY

Gagne, R. M. and Bolles, R. C.
November 1958
Princeton University, N. J.
Report, AFOSR TN-58-924
ASTIA AD-162,278

An attempt was made to identify the manipulable conditions of learning which may be used to insure maximum transfer to tasks of a job (learning efficiency). Learning efficiency was discussed with respect to three kinds of tasks: (1) identification, (2) procedure following, and (3) concept using. Findings indicated that the nature of the learning process in human beings is primarily suggestive for the problem of making learning efficient, rather than productive of practical rules for the control of conditions of efficient learning. A review of the factors in efficient learning showed that a number of these factors may, in any given situation, be manipulated to affect learning efficiency. The factors which were studied included the "readiness" factors of: (1) motivation, (2) reinforcement, and (3) set; and the "associative" factors of: (1) the nature of what is to be learned, (2) intra-trial factors, and (3) inter-trial factors.

857. INTERNAL REFERENTS AND THE CONCEPT OF REINFORCEMENT

Bevan, W. and Adamson, R.
1958
University of New Mexico, Albuquerque
Report, AFOSR TN-58-1101, AF 49(638)33,
ASTIA AD-207,822

A reconceptualization is outlined of reinforcement based on assumptions that the organism is capable of averaging input over time, thus deriving internal norms, that the magnitude of reinforcement depends directly on these norms, that reinforcement exerts its influence upon performance through its effect upon tension level, and that there is a curvilinear relation between tension level and performance efficiency. The results of experiments relating to the validity of these assumptions are presented; and implications of the present point of view for understanding changes in the efficacy of reinforcing agents, partial reinforcement, extinction and reacquisition, and the performance of anxious and non-anxious subjects are reviewed.

858. INTERACTION AMONG COMPONENTS OF A MULTIPLE SCHEDULE

Herrnstein, R. J. and Brady, J. V.
1958
Walter Reed Army Institute of Research, Washingon, D.C.
ASTIA AD-219,824

A multiple schedule, consisting of a fixed interval for food reinforcement, a period of S^{Δ}, a period of shock avoidance, and another period of S^{Δ}, was investigated for possible interactions among the components. It was shown that variations in the interval for which responses postponed the shock in avoidance periods produced changes in the rate of avoidance responding and in the

rate of responding during both S^{Δ} periods. As this interval was shortened, these rates rose. The rate of responding during the fixed-internal component decreased for one S and remained unchanged for the other.

859. PERCEPTUAL ORGANIZATION AND LEARNING
Köhler, W.
***American Journal of Psychology,* v. 71, pp. 311–315, 1958**

A review and critical examination of the role of organization in intentional and incidental learning with particular reference to the studies by Postman and Phillips, by Siegel, and by Saul and Osgood. (*PsyA*, 1959, #5611)

860. ETUDE EXPERIMENTALE DES CONDUITES TEMPORELLES (EXPERIMENTAL STUDY OF TEMPORAL BEHAVIOR)
Fraisse, P. and Orsini, F.
***Année psychologique*, v. 58, pp. 1–6, 1958**

Estimation of duration becomes more precise with age. The aims of the present study are to examine the genetic evolution of this behavior and ultimately to test time estimation among children and the mentally ill. Both estimation of duration and the processes involved in learning are examined. (*PsyA*, 1959, #9508)

861. LEARNING
Lawrence, D. H.
***Annual Review of Psychology,* v. 9, pp. 157–188, 1958**

Literature for the period April 1956 to April 1957 is reviewed under the headings of stimulus and response, drive, reinforcement, extinction, and verbal learning. 156-item bibliography. (*PsyA*, 1958, #3844)

862. A STIMULUS-TRACE HYPOTHESIS FOR STATISTICAL LEARNING THEORY
Witte, R. S. (Stanford University, Calif., 1958, Thesis)
***Dissertation Abstracts*, v. 18, p. 1510, 1958**

863. DELAY OF REINFORCEMENT, RESPONSE PERSEVERATION, AND DISCRIMINATION REVERSAL
Pubols, B. H., Jr.
***Journal of Experimental Psychology,* v. 56, pp. 32–40, 1958**

Using male albino rats in a one-unit Y-maze, it was found that the number of days necessary for discrimination learning criterion was a negatively accelerated, increasing function of delay of reward during acquisition. Response perseveration was an increasing function of delay during acquisition. Acquisition is considered as the adapting of competing responses, and extinction as the de-adapting of adapted competing responses. 25 references. (*PsyA*, 1959, #9859)

864. LEARNING PERCEPTUAL SKILLS
Allan, M. D.
***Perceptual and Motor Skills*, v. 8, p. 214, 1958**

In understanding how organisms learn, "it is conceivable that the power of the human communication system depends upon the ability to 'recode,' and it is suggested that, in the human organism, there is a built-in mechanism for 'recoding' stimuli from the external environment into perceptual structures which can thenceforth be manipulated as units. Recoding in this sense is learning, and it implies the existence of an innate capacity to learn by a process of perceptual organization. Thus, in learning skills, it is better to start with a whole structure instead of proceeding from memorized detail to the whole because, if the details are always noted in relation to a 'whole,' the perceptual organization takes place automatically." (*PsyA*, 1959, #5537)

865. STOCHASTIC MODELS FOR THE LEARNING PROCESS
Mostellar, F.
***Proceedings of the American Philosophical Society,* v. 102, pp. 53–59, 1958**

Three examples of the use of stochastic (probabilistic) mathematical models for the understanding of how learning occurs: (1) Escape-avoidance situation. "Stat-dogs" (hypothetical dogs in statistical model) compared with real dogs (in experiment). Certain mathematical assumptions give close agreement. (2) Mixed reinforcement and

extinction with fish. Two mathematical alternatives. In one set "stat-fish" and real fish agree, supporting choice of one theory over the other. (3) Mathematical assumptions for Estes' compound learning give frequencies that agree closely with empirical findings, confirming his hypothesis. A new mathematical problem is discussed. 31 references. (*PsyA*, 1959, #3176)

866. STUDIES IN THE NEUROPHYSIOLOGY OF LEARNING. PART IV.

Gengerelli, J. A. and Woskow, M. H.
***Psychological Reports*, v. 4, pp. 199–208, 1958**

867. THE DEFINITION AND ANALYSIS OF PERCEPTUAL LEARNING

Wohlwill, J. F.
***Psychological Review*, v. 65, pp. 283–295, 1958**

"The development of a generalization of a previously established differential response to a new stimulus" is the criterion for perceptual learning. This definition distinguishes between learning due to perceptual functions and that due to response association. Hence, neither *S-R* association nor reinforcement is necessary. Specific testable problems are discussed. 35 references. (*PsyA*, 1959, #9888)

868. THE CONCEPT OF IDENTIFICATION

Kagan, J.
***Psychological Review*, v. 65, pp. 296–305, 1958**

Identification is analyzed in respect to learning-theory. It is an acquired, cognitive response, varying in strength. The motivation is "a desire for the positive goal states commanded by the model." The two goals motivating identification are mastery of the environment and love. Propinquity to the model and one's age are variables effecting the strength of the identification. 26 references. (*PsyA*, 1959, #9517)

869. TRANSFER OF TRAINING AND ITS RELATION TO PERCEPTUAL LEARNING AND RECOGNITION

Vanderplas, J. M.
***Psychological Review*, v. 65, pp. 375–385, 1958**

An attempt is made to bring together several current concepts emanating from studies of transfer of training and their implications in studying perceptual learning and recognition. Topics discussed are: the relation between transfer of training and recognition, applicability of principles of transfer of training to the study of recognition, *S-R* similarity relations and transfer, stimulus discrimination, and verbal mediation. The formulations of transfer thus considered involve assumptions that are generalizable to the study of recognition. 40 references. (*PsyA*, 1959, #9881)

870. THE INCLUSION OF RESPONSE TIMES WITHIN A STOCHASTIC DESCRIPTION OF THE LEARNING BEHAVIOR OF INDIVIDUAL SUBJECTS

Audley, R. J.
***Psychometrika*, v. 23, pp. 25–31, 1958**

A stochastic process applicable to the learning behavior of an individual subject is discussed. The process describes both the response times and the sequence of choices obtained from a situation involving two alternatives. Parameter estimates and techniques for assessing goodness of fit are considered. (*PsyA*, 1959, #5542)

871. A MARKOV MODEL FOR DISCRIMINATION LEARNING

Atkinson, R. C.
***Psychometrika*, v. 23, pp. 309–322, 1958**

A quantitative theory of discrimination learning is presented which uses the concept of an observing response. In other respects it is analogous to the models of Burke and Estes or Bush and Mosteller. The implications of the theory are derived in detail for the case where two kinds of stimuli are presented and two kinds of responses are possible. Results of experiments with regular and partial reinforcement are compared to predictions from the model. 16 references. (*PsyA*, 1959, #9776)

872. THE PSYCHOLOGY OF LEARNING

Deese, J.
McGraw-Hill Book Co., Inc., New York, N.Y.
1958 (Second Edition)

878. FACTORS INFLUENCING THE LEARNING AND RETENTION OF VERBAL MATERIALS
Underwood, B. J.
July 6, 1959
Northwestern University, Evanston, Ill.
Final Report, N7onr-45008
ASTIA AD-218,712

879. STUDIES IN ABSTRACTION LEARNING: I. A COMPARISON OF PERCEPTUAL VERSUS ABSTRACTION LEARNING
Ericksen, S. C.
August 1959
Vanderbilt University, Nashville, Tenn.
TR 3, Nonr-214901
ASTIA AD-220,929

An attempt was made to provide a more explicit integration between thinking (abstraction) and perception as subcategories within the generic area of human learning. Two groups, each of which contained 14 human subjects, were compared in a three-point, temporal walking maze. One group was blindfolded while the other group had no visual interference. The seeing subjects were labeled perceptual learners since they were free to use all available and relevant maze and room cues in learning to walk the correct temporal pattern via the three treadles. The blindfolded subjects were labeled abstraction learners since the external sensory cues were either not available or were irrelevent for controlling the required sequence of movements. The data indicated that seeing and blindfolded subjects can learn a 12-choice temporal walking maze with about equal efficiency. After a shift to a new starting point (rotating the maze) the blindfolded learners showed superior ability in adapting to the new demands of the three transfer tasks.

880. STUDIES IN ABSTRACTION LEARNING. II. THE RELATIVE DIFFICULTY OF "PLACE" AND "RESPONSE" LEARNING IN A HUMAN TEMPORAL MAZE
Ericksen, S. C. and Porter, C. R.
August 1959
Vanderbilt University, Nashville, Tenn.
TR 4, Nonr-214901
ASTIA AD-220,928

A methodological study dominated by operationally defined conditions of perceptual (Place) learning and abstraction (Response) learning is described. The experimental objective was to compare the learning difficulty of a temporal series of Place vs. Response decisions. Both tasks involved some degree of abstracting, at least counting, but the Place learners were required to utilize objective, environment cues while the Response learners ignored these external cues and controlled their learning by a self-generated set of directional cues, i.e., to go right or to go left. There were no significant differences in performance scores between the two groups being tested in these walking maze tasks. Within the limits of such a learning situation, it appears that the dependent variable responses that help define abstraction learning are no more difficult to acquire than are those responses, verbal or otherwise, which serve to define perception learning. The larger systematic importance of this series of studies on the abstraction process is believed to rest with the greater specificity given to the mediational processes which are hypothesized to account for the consistency of learning and problem solving in an ever-changing environment, i.e. thinking.

881. ON THE TRAINING OF ORIGINALITY
Maltzman, I.
August 1959
University of California at Los Angeles
TR 5, Nonr-23350
ASTIA AD-225,545

The basic problem in the training of originality is to devise a means of increasing the frequency of uncommon behavior. Once it takes place it may receive reinforcement and increase the probability that other original behavior will occur. Earlier attempts to devise training methods for originality were briefly mentioned, as well as related studies of problem solving. A series of experiments by Maltzman and his associates was reviewed and a procedure which consistently facilitated originality was described. This procedure involves the repeated presentation of a list of stimulus words in a modified free association situation accompanied by instructions to give a different response to each stimulus. Under these conditions the responses become more uncommon. When presented with new stimulus materials subjects receiving such training are reliably more original than subjects receiving no training. Tentative suggestions as to the behavioral bases for the training effect were also given.

This edition, like the first, consists of a basic presentation of many of the experimental findings and theoretical problems relevant to the field of learning. It differs in that fewer topics are considered, in greater detail, and more attention is paid to theory. 23 pages references. (*PsyA*, 1959, #9804)

873. CONDITIONAL PROBABILITY IN A NERVOUS SYSTEM

Uttley, A. M.
National Physical Laboratory Symposium, Teddington, England, 1958
Her British Majesty's Stationery Office, London

874. SOME ASYMPTOTIC PROPERTIES OF LUCE'S BETA LEARNING MODEL

Lamperti, J. and Suppes, P.
April 24, 1959
Stanford University, Applied Mathematics and Statistics Lab., Calif.
TR 22, Nonr-22517
ASTIA AD-216,587

This report discusses: noncontingent reinforcement with two operators, two theorems on random walks, contingent reinforcement with two operators, and contingent reinforcement with four operators.

875. A THEORY OF STIMULUS DISCRIMINATION LEARNING

Atkinson, R. C.
May 11, 1959
University of California at Los Angeles
TR 1, Nonr-23358
ASTIA AD-217,757

A theory of discrimination learning is presented. The analysis is restricted to situations where only one of two stimuli (S_1 or S_2) is presented on each trial. The subject makes one of two responses (A_1 or A_2), which are mutually exclusive and exhaustive. A trial is terminated by a reinforcing event (E_1 or E_2). If an E_1 occurs, A_1 is reinforced; if an E_2 occurs, A_2 is reinforced. Thus the experimenter can present one of the following four combinations: (S_1, E_1), (S_1, E_2), (S_2, E_1) or (S_2, E_2). The respective probabilities of these four events are a, b, c, and d, where $a + b + c + d = 1$. The present model aims to account for the following factors in discrimination learning: (1) the effect of stimulus dimensions, (2) the effect of reinforcement schedules, (3) the effect of stimulus schedules, and (4) previous experience on other discrimination tasks. This theory can be readily generalized to situations involving more than two stimuli.

876. INFORMATION CONTENT OF LEARNED MESSAGES

Davis, L. W. and Basore, B. L.
May 28, 1959
Dikewood Corp., Albuquerque, N. Mex.
QR-3-1004, RADC TN-59-209, AF 30(602)1890
ASTIA AD-217,682

The primary purpose of this study was to investigate the application of communication-theory techniques to the theory of learning. A search of the existing literature revealed a dearth of material in the field; therefore, it was necessary to initiate a new effort. Encouraging results were obtained in the direction of measuring the information content of learned messages and were applied to the learning of "binary mosaics" or simple message patterns.

877. NEUROPHYSIOLOGICAL MECHANISMS OF LEARNING

Jouvet, M.
June 1959
Lyons University, France
Final Technical Report, AFOSR TR-59-77, AF 61(514)1206
ASTIA AD-218,389

Contents:

I. Clinical neurophysiology
  A. The neurophysiological mechanisms of attention
II. Experimental neurophysiology
  A. Acute experiments
  B. Research on the central control of acoustic afferents
  C. Research on activating drugs
III. Chronic experiments
  A. The problem of sleep
  B. Habituation of arousal

882. **A SELF ORGANIZING LOGICAL SYSTEM**
Mattson, R. L.
Paper presented at the 1959 Eastern Joint Computer Conference, Boston, Mass., December 1–3, 1959
Institute of Radio Engineers, New York, N. Y.

883. **LEARNING**
Kendler, H. H.
Annual Review of Psychology, v. 10, pp. 43–88, 1959

884. **A MODEL OF HYPOTHESIS BEHAVIOR IN DISCRIMINATION LEARNING SET**
Levine, M.
Psychological Review, v. 66, no. 6,
pp. 353–366, November 1959

885. **INTERDISCIPLINARY CONFERENCE ON SELF-ORGANIZING SYSTEMS, MAY 5–6, 1959, CHICAGO, ILL.**
Co-sponsored by the Naval Research Lab., Information Systems Branch, Washington, D.C., and the Armour Research Foundation of the Illinois Institute of Technology, Chicago
See "Self-Organizing Systems," Pergamon Press, New York, N. Y., 1960

The purpose of this conference was to bring together research workers in all fields of science concerned either with the development of self-adaptive information systems or with the conduct of research which may contribute to an improved understanding of cognitive, learning, and growth processes. Particular emphasis was placed on theoretical models of systems capable of spontaneous classification, identification, and symbolization of their inputs.

886. **SELF-ORGANIZING MODELS FOR LEARNED PERCEPTION**
Farley, B. G.
In "Self-Organizing Systems," Pergamon Press, New York, N. Y., 1960

A framework of ideas is suggested for models of systems which automatically organize themselves to classify environmental inputs into recognizable percepts or "patterns." The models operate by computing "properties" of environmental inputs and comparing the results with stored classes of properties to select percepts. Property-classes may be formed from existing lists of properties by operating on the environmental input with suitable rules, and the computation of additional properties may be organized also.

It is suggested that such models, especially on account of their nonlinear character, should be able to perform many of the functions of learned perception as observed in living organisms. They should also prove useful for engineering and scientific purposes. Neurophysiological realization of the models seems possible.

Much investigation of the behavior of such models with various rules in various environments is necessary, however, to verify these suggestions.

MODELS AND THEORIES OF MEMORY OR RECALL

887. PERCEPTION AND VALUATION IN RECOGNITION AND RECALL
Barrett, T. H., Jr.
1953
University of Texas, Austin
Thesis

888. ATTENTION AND MEMORY IN LISTENING TO SPEECH
Broadbent, D. E.
January 1954
Applied Psychology Research Unit, Cambridge, Great Britain
Report APU 207/54
ASTIA AD-37,688

Consideration is given to the functions involved in understanding and initiating response to speech when it arrives at a particular listener on a particular occasion. The role of attention and memory in listening to speech is discussed, and the research in this field is reviewed.

889. A HYPOTHESIS REGARDING THE BRAIN MODIFICATIONS UNDERLYING MEMORY
Whyte, L. L.
***Brain*, v. 77, pp. 158–165, 1954**

A conceptual scheme of brain function is presented according to which the memory processes are not identified with a cell assembly, neutral circuit, synaptic pattern, or any other arrangement of cell surfaces. The functional element in memory is a continuous three-dimensional mass of cortical cytoplasm that acts as a volume conductor. (*PsyA*, 1955, #3404)

890. THE APPLICATION OF CYBERNETICS TO PSYCHIATRY
Ashby, W. R.
***Journal of Mental Science*, v. 100, pp. 114–124, 1954**

Consideration of the problems of memory, of integration, and of psychotherapy suggests that the new science of cybernetics may eventually throw light on each of these problems. (*PsyA*, 1955, #1061)

891. SUCCESSIVE RESPONSES TO SIMULTANEOUS STIMULI
Broadbent, D. E.
April 1955
Flying Personnel Research Committee, Great Britain
Report 934, Report RNP 55/837, OES 260
ASTIA AD-73,514

Previous work had shown that, when a memory span experiment is performed with half the items presented to one ear, and half simultaneously to the other, a certain order of response appears. Either one ear or the other is dealt with first, and then the remaining items produce a response afterwards. The present results extend this finding to the eye and the ear rather than the two ears, and also to two voices distinguished by their frequency characteristics. For the latter condition, it is also shown that alternation of attention can take place at a speed faster than between the two ears. It is then demonstrated that if recall is required in a particular order, and the subject does not know this order in advance, he will either show lowered efficiency or else an abnormal relation between mistakes and serial position. When he does know the order of recall in advance, his efficiency is also reduced by altering the time of presentation of the last items to be recalled, and by inserting irrelevant items. These last facts support a particular theory of immediate memory; though they do not establish it conclusively.

892. THE INFLUENCE OF MEANINGFULNESS, INTRALIST SIMILARITY, AND SERIAL POSITION ON RETENTION
Underwood, B. J. and Richardson, J.
August 1, 1955
Northwestern University, Evanston, Ill.
N7onr-45008
ASTIA AD-113,572

The results show: (1) In learning, the lower the intralist similarity the faster the learning and the higher the meaningfulness the faster the learning. Intralist similarity produced a greater difference with the low-meaningful lists than the high. (2) For low meaningfulness, recall was sig-

nificantly better with low intralist similarity than with high intralist similarity. No difference was observed for the high-meaningful lists. (3) Meaningfulness did not significantly influence recall. (4) Recall was not related to serial position when response strengths at end of learning were equalized for all serial positions.

893. SYMMETRY, INFORMATION, AND MEMORY FOR PATTERNS
Attneave, F.
1955
Lackland AFB, Texas
AFPTRC-TN-55-29
(See also *American Journal of Psychology*, v. 68, pp. 209–222, 1955)

894. ON MEMORY MODALITIES
Wallach, H. and Averbach, E.
***American Journal of Psychology*, v. 68, pp. 249–257, 1955**

The hypothesis is that direct recognition requires that the perceptual event stimulating recognition and the memory trace aroused be of the same modality. For example, a visual event can be directly recognized only when the trace it arouses is of a previous visual (or auditory, verbal, or combination) experience of that event. To test the hypothesis serial lists of nonsense words were presented to groups of Ss. Ss were required to read every other word backward as it appeared. A test of recognition followed. Better recognition for words read forward is taken as supporting the hypothesis. (*PsyA*, 1956, #2416)

895. HUMAN MEMORY AND THE STORAGE OF INFORMATION
Miller, G. A.
1956
Harvard University, Cambridge, Mass.
Report PNR-185, AFCRC TR-56-54,
AF 33(038)14343
ASTIA AD-114,120

896. STRENGTH OF ASSOCIATION AND FORGETTING
Underwood, B. J.
1956
Northwestern University, Evanston, Ill.
N7onr-45008
ASTIA AD-113,573

Two general problems are studied: (1) an assessment of the basic probability method for predicting strength of associations in rote-learned materials and a discussion of refinements in the method, and (2) the relationship between strength of association and forgetting. The strengths of items in lists learned at different rates are equated by the probability method. The interaction between strength and other variables is determined by this method also, and factors influencing the accuracy of predictions made in this way are discussed. The results of the study show that because of logical contradictions, the relationship between strength of association and forgetting cannot be expressed in terms of absolute loss but must be made in terms of proportion lost. This relationship indicates that the stronger the item is, the less there is forgotten over a 24-hr period; however, forgetting decreases even when the acquisition probabilities no longer increase. The accuracy of the probability method is discussed, and other techniques employed in handling the strength problem are mentioned.

897. PERCEPTION ET FIXATION MNEMONIQUE (PERCEPTION AND MNEMONIC TRACE)
Fraisse, P. and Florés, C.
***Année psychologique*, v. 56, pp. 1–11, 1956**

Does the richness of the perceptive response determine the richness of recall or is the mnemonic trace a function of the perceptive process? The present hypothesis assumes a functional independence of these two processes. (*PsyA*, 1958, #3818)

898. MEMORY IN THE NERVOUS SYSTEM AND STORAGE IN COMPUTERS
Uttley, A. M.
***Bulletin of the British Psychological Society*, v. 69, pp. 395–402, 1956**

899. NOTE ON REMARKABLE MEMORY OF MAN
Miller, G. A.
***IRE Transactions on Electronic Computers*, v. EC-6, no. 3, pp. 194–195, September 1957**

900. A MECHANICAL MODEL FOR HUMAN ATTENTION AND IMMEDIATE MEMORY
Broadbent, D. E.
Psychological Review, v. 64, pp. 205–215, 1957

A mechanical model is described, to act as an easy introduction to a formal theory of attention and immediate memory in information theory terms. A number of deductions from the theory which agree with experimental results on human beings are given as descriptions of the behavior of the model. 38 references. (*PsyA*, 1958, #5091)

901. DAS GEDÄCHTNIS ALS FUNKTION GEHIRNS (MEMORY AS A FUNCTION OF THE BRAIN)
Feudell, P.
Zeitschrift für Alternsforschung, v. 11, pp. 23–34, 1957

A review of theoretical and empirical works concerning memory as a function of the brain. (*PsyA*, 1959, #3121)

902. RECOGNITION MEMORY AND THE OPERATING CHARACTERISTIC
Egan, J. P.
June 15, 1958
Indiana University, Hearing and Communication Lab., Bloomington
Technical Note, AFCRC TN-58-51, AF 19(604)1962
ASTIA AD-152,650

The role of the subject's criterion in a test of recognition memory was examined. Recognition memory was measured by requiring the subject to discriminate between old and new stimuli. The subject's behavior under various criteria was described by an operating characteristic. The operating characteristic is the relation between the probability that the subject will respond yes when an old stimulus is presented ($p(Y_o/S_o)$) and when a stimulus is presented (pY_o/S_n)). Data suggested the shape of the operating characteristic for recognition memory to be that generated by passing the criterion cut through two normal curves with δ_o/δ_n equal to about 1.5. The operating characteristics obtained with a 5-point scale was nearly the same as that obtained with a 7-point scale.

903. ETUDE SUR LES PROCESSUS D'UTILLISATION DE LA TRACE MNESIQUE: LE RAPPEL LA RECONNAISSANCE, ET LE REAPPRENTISSAGE (STUDY OF THE METHOD OF UTILIZING THE MNESIC TRACE: RECALL, RECOGNITION, AND RELEARNING)
Flores, C.
Année psychologique, v. 58, pp. 25–43, 1958

It is attempted to verify by correlation the importance of functional connections between recall, recognition, and relearning in long-term retention. Though these processes are correlated, they reveal varying degrees of relationship and independence. The rapidity of the mnemonic fixation with learning correlations is compared with the efficacity of retention, whatever the means used in evaluating this. (*PsyA*, 1959, #9808)

904. O MOZGE KAK SISTEME AVTONOMNOĬ "PAMIATI" (ON THE BRAIN AS A SYSTEM OF AUTONOMOUS "MEMORY")
Linkovskii, G. B.
Biofizika, v. 3, pp. 385–390, 1958

The thesis is proposed and developed that the brain from the mathematical point of view is an "assemblage of auto-oscillatory systems with feedback." These systems are described by means of "functional equations with lagging argument." The action of these systems is electrochemical. On the basis of the foregoing the question of human memory is examined and a mathematical theory of dynamic memory developed. Analysis demonstrates the existence of two systems of autonomous memory: one of "absolute memory"; another of "relative memory." The brain is held to possess "dynamic relative memory," although in certain parts of the brain "purely static memory" may exist. (*PsyA*, 1959, #5227)

905. FACTOR ANALYTIC STUDY OF VISUAL MEMORY
Christal, R. E.
***Psychological Monographs: General and Applied*, v. 72, 1958**

A group of 718 air force enlisted men at the start of their basic indoctrination training at Lackland Air Force Base, Texas, were subjected to a total of 17 experimental memory tests as well as 14 reference tests. 12 centroid factors were extracted from the intercorrelations and 11 of them rotated orthogonally. Some of the tentative conclusions based on this study were: (1) "Differential loss invention among individuals extending over more than a

single test (if it occurs) does not occur to a great extent during the first few hours after exposure to stimulus material." (2) "Memory for color represents a special ability which is relatively independent of associative memory." (3) "There is a special ability for remembering the position of objects in space." (4) "There is a special ability for remembering the relative position of events in a time series." 16 references. (*PsyA*, 1959, #9796)

906. GUESSING, EXPECTANCY AND AUTONOMOUS CHANGE
James, H.
***Quarterly Journal of Experimental Psychology,* v. 10, pp. 107–110, 1958**

An attempt was made to test the hypothesis that changes in memory of the kind ascribed by Gestalt theory to autonomous processes are due, not to changes in the memory trace, but to non-random guessing. Judgments of difference between original and recognition figures are shown to be related to guesses as to what these differences are likely to be, but the relation is not such that it can be predicted from a simple guessing hypothesis. (*PsyA*, 1959, #9754)

907. THE MAMMALIAN CEREBRAL CORTEX
Burns, B. D.
Williams and Wilkins, Baltimore, Md., 1958
Edward Arnold Ltd., London, England, 1958

The author discusses some of the more common neurophysiological concepts derived from his work and work of others on the cerebral cortex. These are presented in clear terms requiring little or no understanding of the methods by which they were derived. These concepts are then used to form the basic neurophysiological theory of learning and memory. 239 references. (*PsyA*, 1959, #223)

908. SOME MATHEMATICAL FUNDAMENTALS OF THE USE OF SYMBOLS IN INFORMATION RETRIEVAL
Mooers, C. N.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 315–321

909. THE ROLE OF MEMORY IN THE ACQUISITION OF CONCEPTS
Cahill, H. E. and Hovland, C. I.
***Journal of Experimental Psychology,* v. 59, pp. 137–144, 1960**

DECISION MAKING BY MACHINE

910. A SYMBOLIC ANALYSIS OF RELAY AND SWITCHING CIRCUITS
Shannon, C. E.
Transactions of the American Institute of Electrical Engineers, v. 57, pp. 713–723, 1938

911. CYBERNETICS
Wiener, N.
John Wiley & Sons, New York, N. Y., 1948

912. PROGRAMMING A COMPUTER FOR PLAYING CHESS
Shannon, C. E.
The Philosophical Magazine, v. 41, pp. 256–275, March 1950

913. THE CHESS MACHINE: AN EXAMPLE OF DEALING WITH A COMPLEX TASK BY ADAPTATION
Newell, A.
Proceedings of the Western Joint Computer Conference, Los Angeles, Calif., March 1–3, 1955, pp. 101–108
Institute of Radio Engineers, New York, N. Y.

914. COMPUTING MACHINES AND AUTOMATIC DECISIONS
Tompkins, C. B.
June 6, 1956
Numerical Analysis Research, University of California at Los Angeles
Technical Report, Nonr-23324, DA 04-495-ORD-559
ASTIA AD-96,409

Elementary decision processes are described along with computing techniques which are immediately susceptible to application in mechanical and electronic equipment. The topics discussed include the binary analysis of decisions, the binary numbering system, electronic elements capable of binary decision and computation, the structure of the common machine, and some early effects to be expected from the development of computers.

915. DYNAMIC PROGRAMMING
Bellman, R.
September 1, 1956
RAND Corp., Santa Monica, Calif.
R-295

The purpose of this work is to provide an introduction to the mathematical theory of multi-stage decision processes.

916. STRATEGIC INFORMATION IN GAMES AND IN VOTING
Farquharson, R.
Proceedings of the Third Symposium on Information Theory, Royal Institution, London, September 12–16, 1955
In "Information Theory," Cherry C., Editor
Academic Press, New York, N. Y., 1956, pp. 47–52

The complexity and solution of multi-person games is a function of the distribution of information among the participants. Strategic information is represented by partitions in a finite set of possible plays. (*PsyA*, 1957, #4596)

917. THE LOGIC THEORY MACHINE
Newell, A. and Simon, H. A.
IRE Transactions on Information Theory, v. IT-2, no. 3, pp. 61–79, September 1956

918. EMPIRICAL EXPLORATIONS OF THE LOGIC THEORY MACHINE
Newell, A., Shaw, J. C., and Simon, H. A.
Proceedings of the Western Joint Computer Conference, Los Angeles, Calif., February 1957
Institute of Radio Engineers, New York, N. Y.

919. PROGRAMMING THE LOGIC THEORY MACHINE
Newell, A. and Shaw, J. C.
Proceedings of the Western Joint Computer Conference, Los Angeles, Calif., February 1957
Institute of Radio Engineers, New York, N. Y.

920. EXPERIMENTS IN CHESS
Kister, J., et al.
***Journal of the Association for Computing Machinery*, v. 4, no. 2, pp. 174–176, April 1957**

921. EXPERIMENTS IN CHESS ON ELECTRONIC COMPUTING MACHINES
Stein, P. and Ulam, S.
***Computers and Automation*, v. 6, no. 9, p. 14, September 1957**

922. INDUCTIVE INFERENCE MACHINE
Solomonoff, R. J.
***IRE Convention Record*, v. 5, Part 2, Information Theory, pp. 56–62, 1957**

923. A CHESS-PLAYING PROGRAM FOR THE IBM 704
Bernstein, A.
Proceedings of the Western Joint Computer Conference, Los Angeles, Calif., May 1958
American Institute of Electrical Engineers, New York, N. Y.

924. PROGRAMS WITH COMMON SENSE
McCarthy, J.
Paper presented at the Symposium on the Mechanization of Thought Processes, National Physical Lab., Teddington, England, November 24–27, 1958

925. CHESS-PLAYING PROGRAMS AND PROBLEM OF COMPLEXITY
Newell, A., Shaw, J. C., and Simon, H. A.
***IBM Journal for Research and Development*, v. 2, no. 4, pp. 320–335, October 1958**

Development of digital computer programs that play chess; review of work of Shannon, Turing, Los Alamos group, Bernstein and of Newell, Shaw, and Simon; relation of chess program studies to understanding and construction of complex, intelligent machines. (*EI*, 1958)

926. INTELLIGENT BEHAVIOR IN PROBLEM-SOLVING MACHINES
Gelernter, H. L. and Rochester, N.
***IBM Journal of Research and Development*, v. 2, no. 4, pp. 336–345, October 1958**

Discussion of heuristic methods and learning machines; concept of theory machine as extension of theorem-proving machine: study of particular case of machine that can prove theorems in elementary Euclidean plane geometry. (*EI*, 1958)

927. COMPUTER VERSUS CHESS-PLAYER
Bernstein, A. and Roberts, M. de V.
***Scientific American*, v. 198, pp. 96–98, June 1958**

928. COMPUTABILITY AND UNSOLVABILITY
Davis, M.
McGraw-Hill Book Co., New York, N. Y., 1958

The author, a professor of mathematics, introduces "the theory of computability and noncomputability, also referred to as the theory of recursive functions." His first seven chapters, out of a total of eleven, assume no special mathematical training on the reader's part. He discusses: decision problems, about methods for deciding the truth or falsity of a whole class of statements; computable functions; unsolvable decision problems; mathematical logic; recursive functions; Turing machines; and other topics. There are many illustrative mathematical examples. (*C&A*, February 1959)

929. WORLD BRAINS PONDER MECHANISATION OF THOUGHT PROCESSES
Mobell, G.
***Automation and Automatic Equipment News*, v. 4, no. 5, p. 929, January 1959**

A report of the Teddington, England, symposium on advanced electronic machines which perform logical operations, and certain other "intelligence" operations. The findings and opinions of certain international scientists are cited. (*C&A*, March 1959)

930. REPORT ON A GENERAL PROBLEM-SOLVING PROGRAM
Newell, A., Shaw, J. C., and Simon, H. A.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, France, June 15–20, 1959, pp. 256–264

This paper deals with the theory of problem solving. It describes a program for a digital computer, called General Problem Solver I (GPS), which is part of an investigation into the extremely complex processes that are involved in intelligent, adaptive, and creative behavior. The principal means of investigation is synthesis: programming large digital computers to exhibit intelligent behavior, studying the structure of these computer programs, and examining the problem-solving and other adaptive behaviors that the programs produce. (*C&A*, July 1959)

931. THE USE OF MACHINES IN THE CONSTRUCTION OF A GRAMMAR AND COMPUTER PROGRAM FOR STRUCTURAL ANALYSIS
Harper, K. E. and Hays, D. G.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 188–194

932. REALIZATION OF A GEOMETRY THEOREM PROVING MACHINE
Gelernter, H.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 273–282

933. A NON-HEURISTIC PROGRAM FOR PROVING ELEMENTARY LOGICAL THEOREMS
Dunham, B., Fridshal, R., and Sward, G. L.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 282–285

934. A LOGICAL DECISION CIRCUITRY FOR DIGITAL COMPUTATION
Curtis, D. L.
September 8, 1959
Hughes Aircraft Co., Culver City, Calif.
Patent 2,903,606, Washington, D. C.

935. A LOGIC SOLVING MAGNETIC CORE-CIRCUIT
Meyerhoff, A. J.
September 15, 1959
Burroughs Corp., Detroit, Mich.
Patent 2,904,780, Washington, D. C.

936. GENERAL SWITCHING THEORY
January 15, 1960
University of Pennsylvania, Moore School of Electrical Engineering, Philadelphia
QPR-6, September 16–December 15, 1959, Moore School Report 60-13, AF 33(616)-5886

Progress is reported in the GO and in the RENJYN programs. For the GO, the subprograms called for in the macro-flow chart presented in the Fifth Quarterly Progress Report are partially worked out. Most significant among these are the generalized pattern recognition $u(m)$, the original move generator F, the experience index table look-up E, and the minimax procedure. As for the RENJYN, or GO-MOKU-NARABE, Project, one of the basic objectives is to gain insight into methods by which machines (especially large-scale digital computers) might solve problems that cannot be couched completely in mathematical terms, and are not suitable for solving by algorithmic methods. The machine is to be given rudiments of play and the "ability" to play a legal game; it is then up to the machine to learn, by any of several simultaneous methods, to play a good game.

937. ON-LINE COMPUTATION WITH GENERAL PURPOSE COMPUTERS
Michels, L. S.
***Automatic Control*, v. 10, no. 4, p. 2, April 1959**

Computers used to solve complex mathematical and "decision" problems, are to be used to control the proceses involving those problems. Some of the operations

of a computer in on-line applications, are listed, and the use of two computers on the USS Compass Island is described. (*C&A*, July 1959)

938. **THE DESIGN OF CONDITIONAL PROBABILITY COMPUTERS**
Uttley, A. M.
***Information and Control*, v. 2, no. 1, pp. 1–24, April 1959**

939. **SOME STUDIES IN MACHINE LEARNING USING THE GAME OF CHECKERS**
Samuel, A. L.
***IBM Journal of Research and Development*, v. 3, no. 3, pp. 211–229, July 1959**

Machine learning procedures are investigated, using the game of checkers. To date, from two such procedures it has been found that a computer can learn to play a better game than the programmer who "taught" the machine to play. Moreover, the principles of learning verified by the experiments are applicable to many other situations. Three appendices to the article include programming details, and sample games. (*C&A*, September 1959)

940. **LOGIC BY MACHINE: PROGRAMMING THE LGP-30 TO SOLVE PROBLEMS IN SYMBOLIC LOGIC**
Hagensick, P. W.
***Behavioral Science*, v. 5, no. 1, pp. 87–94, January 1960**

A program enabling a digital computer to solve problems in symbolic logic is described. These problems are now limited to expressions that can be formulated in propositional logic; with relatively minor modifications, the range may be extended to include some of the functional calculi.

941. **GENERAL SWITCHING THEORY**
March 30, 1960
University of Pennsylvania, Moore School of Electrical Engineering, Philadelphia
QPR-7, December 16–March 15, 1960
Moore School Report 60-18, AF 33(616)-5886

Strategic organization of the experience store for the GO program is outlined. Testing the learning section of the RENJYU program is discussed. The submission of Technical Note No. 2 on linear-bounded automata is noted; also noted is work on general learning machines, A revised outline of a recently completed technical note, "First-order Languages of Symbolic Logic With Restricted Quantifiers for the Description of Automata," is included.

MODELS AND THEORIES OF DECISION MAKING

942. ON COMPUTABLE NUMBERS, WITH AN APPLICATION TO THE ENTSCHEIDUNGSPROBLEM
Turing, A. M.
Proceedings of the London Mathematical Society, pp. 2–42, 230–265, 1936

943. A LOGIC OF THE DOUBTFUL: ON OPTATIVE AND IMPERATIVE LOGIC
Menger, K.
Report on Mathematical Colloquium, Notre Dame, Ind., 1939, Series 2, no. 1, pp. 53–64

The paper "seems to constitute an important step in the direction of formal analyses of valuational concepts."

A review is presented in *Journal of Symbolic Logic*, v. 5, p. 40, 1940.

944. THE THEORY OF GAMES AND ECONOMIC BEHAVIOUR
von Neumann, J. and Morgenstern, O.
Princeton University Press, N. J., 1947 (Second Edition)

945. PROBABILITY AND THE WEIGHING OF EVIDENCE
Good, I. J.
Hafner Publishing Co., Inc., New York, N. Y., 1950

946. CYBERNETICS; CIRCULAR CAUSAL, AND FEEDBACK MECHANISMS IN BIOLOGICAL AND SOCIAL SYSTEMS. TRANSACTIONS OF THE SIXTH CONFERENCE, MARCH 24–25, 1949, NEW YORK, N. Y.
von Foerster, H., Editor
Josiah Macy, Jr., Foundation, New York, N. Y., 1950

The following topics were discussed: Psychological Moment in Perception, by J. Stroud; Neurotic Potential and Human Adaptation, by L. S. Kubie; Quantum Mechanical Theory of Memory, by H. von Foerster; Possible Mechanisms of Recall and Recognition, a discussion; and Sensory Prostheses, by N. Wiener. 22 references. (*PsyA*, 1957, #1957)

947. DECISIONS WITH INCOMPLETE INFORMATION
Dalkey, N. C.
April 25, 1952
RAND Corp., Santa Monica, Calif.
P-299-A

It is shown that the usual requirements of consistency, continuity, and convexity in choices made under incomplete information have the consequence that the decision maker must be guided by a set of weights, analogous to probabilities, for the possible relevant states of nature.

948. THE STIMULUS TRACE IN EFFECTORS AND ITS RELATION TO JUDGMENT RESPONSES
Davis, J. F.
Journal of Experimental Psychology, v. 44, pp. 377–390, 1952

949. RATIONAL DECISIONS
Journal of the Royal Statistical Society, London, Series B, v. 14, pp. 107–114, 1952

950. EXPERIMENTAL ANALYSIS OF PROBLEM-SOLVING BEHAVIOR
Kendler, H. H.
November 15, 1953
New York University, University College of Arts and Science, N. Y.
TR 1, Nonr-18700
ASTIA AD-23,524

Attempts were made to extend conditioning theory to the realm of problem-solving behavior. Experiments on the influence of massed and distributed practice on men-

tal set failed to confirm the extinction hypothesis of Kendler, Greenberg, and Richman (*Journal of Experimental Psychology*, v. 43, pp.21–25, 1952). The influence that learning single concepts had on the learning of compound concepts was studied. Some subjects who learned simple concepts failed to learn compound concepts composed of those simple concepts. An explanation of this phenomenon based on the importance of verbal factors in problem-solving behavior was proposed. Results of other studies suggested that training subjects to be flexible on specific tasks was more feasible than training for a general flexible thinking behavior. Unsuccessful attempts were made to demonstrate a relationship between the frequency of reinforcement and inflexibility in concept formation. The experiments also indicated that the individual trial in conditioning was not coordinated in a simple manner to the single trial in concept-formation tests.

951. SOME EFFECTS OF PROBLEM COMPLEXITY UPON PROBLEM SOLUTION EFFICIENCY IN DIFFERENT COMMUNICATION NETS
Shaw, M. E.
April 20, 1954
Johns Hopkins University, Psychological Lab., Baltimore, Md.
Report 166-I-184, N5ori-16601
ASTIA AD-218,811

Twenty-four groups of three subjects (S) each were run to test the hypothesis that a communication net in which Ss are placed in equal positions will require less time to solve relatively complex problems but more time to solve relatively simple problems than will a net in which one S is placed in a central position. Six groups were assigned to each of four conditions: (1) the wheel–simple problems, (2) the wheel–complex problems, (3) the circle–simple problems, and (4) the circle–complex problems. The outcome of this experiment generally supports the hypothesis. However, the differences in times required to solve the simple problems by the Ss in the two nets, although in the expected direction, failed to reach statistical significance. A secondary purpose was to collect additional data regarding (1) the effects of the variables of communication net and problem complexity upon number of errors, number of items communicated, and group morale, and (2) the usefulness of the independence measure for predicting number of items communicated by Ss in each position and general satisfaction with the group situation of Ss in each position.

952. ABSOLUTE JUDGMENTS AS A FUNCTION OF THE STIMULUS RANGE AND THE NUMBER OF STIMULUS AND RESPONSE CATEGORIES
Eriksen, C. W. and Hoke, H. W.
April 1954
Johns Hopkins University, Institute for Cooperative Research, Baltimore, Md.
Report on Presentation of Data on Radar Scopes and Human Engineering Analysis of Multiple Operator Air–Ground Systems
AF (038)22642, WADC TR 54-162
ASTIA AD-38,145

In the psychophysical method of absolute judgment, subjects are required to identify by a name, number or other value each member of a set of individually presented stimuli. Since the method does not provide any explicit standard for comparison, the subject is required to base his judgments upon some subjective standard or reference point. This is essentially the condition under which we make many important judgments during our daily activities. The effects of three variables upon judgmental accuracy under the absolute method were studied. These were: the range on a stimulus dimension over which stimulus categories were selected for judgment, the number of stimulus categories presented for judgment, and the number of response categories available to the subject for expressing his judgments. Doubling of the stimulus dimension produced some increase in judgmental accuracy, but the increase was slight. Judgmental accuracy remained constant as the number of stimulus and response categories was increased, with size of stimulus dimension held constant, provided that the number of response categories equaled or exceeded the number of stimulus categories. There was a loss in discrimination ability when the number of response categories was less than the number of stimuli to be judged. It was suggested that both of these results could be attributed to the end or anchor effects which appear to characterize the absolute method.

953. CONCEPT IDENTIFICATION AS A FUNCTION OF IRRELEVANT INFORMATION AND INSTRUCTIONS
Archer, E. J., Bourne, L. E., Jr., and Brown, F. G.
June 21, 1954
University of Wisconsin, Madison
Research Report, AFPTRC-TN-55-50,
AF 33(038)23294
ASTIA AD-94,669

954. SEARCH BEHAVIOR IN INDIVIDUAL AND GROUP PROBLEM SOLVING
Moore, O. K. and Anderson, S. B.
American Sociological Review, v. 19, pp. 702–714, 1954

955. A FURTHER INVESTIGATION OF RESPONSE SELECTION IN SIMULTANEOUS AND SUCCESSIVE DISCRIMINATION
Calvin, A. D. and Seibel, J. L.
Journal of Experimental Psychology, v. 48, pp. 339–342, 1954

The Weise and Bitterman experiment was replicated with their maze modified so that the lamps which served as cues were placed at the end of the respective maze arms. It was hypothesized that with this breaking up of the spatial unity of the cues the simultaneous discrimination would be easier than the successive. . . . However, the hypothesis was not confirmed, as the successive discrimination again proved easier than the simultaneous. An analysis of the data indicated that various factors such as the goal gradient, alternation, etc., were operating differentially in the two types of discrimination. (*PsyA*, 1955, #5222)

956. A TENTATIVE CLASSIFICATION OF GOAL-SEEKING BEHAVIORS
Schützenberger, M. P.
Journal of Mental Science, v. 100, pp. 97–102, 1954

Span of foresight and degree of flexibility are factors of special importance in the possible mathematical description of complex goal-seeking behavior. (*PsyA*, 1955, #413)

957. MODERN LOGIC AND TASKS FOR EXPERIMENTS ON PROBLEM SOLVING BEHAVIOR
Moore, O. K. and Anderson, S. B.
Journal of Psychology, v. 38, pp. 151–160, 1954

958. THE CASE FOR PERCEPTUAL DEFENSE
Eriksen, C. W.
Psychological Review, v. 61, pp. 175–182, 1954

Two experimental requirements are shown to be basic to an adequate test of the perceptual defense hypothesis. First, it must be shown that the stimuli used are anxiety arousing for all subjects studied, and second, that the subjects have available avoidance defenses appropriate to these anxiety sources. A number of experiments on this question are shown to be inadequate by these criteria, but some are seen as adequate and as supporting the perceptual defense notion. A possible explanation for the phenomenon is offered in terms of the previously demonstrated effects of anxiety upon problem solving and other cognitive functions. 39 references. (*PsyA*, 1955, #1939)

959. DECISION PROCESSES
Thrall, R. M., Coombs, C. H., and Davis, R. L., Editors
John Wiley & Sons., Inc., New York, N. Y., 1954

960. REPRODUCTION OF SIMPLE MOVEMENTS AS A FUNCTION OF FACTORS INFLUENCING PROPRIOCEPTIVE FEEDBACK
Bahrick, H. P., Fitts, P. M., and Schneider, R.
January 20, 1955
Ohio State University Research Foundation, Columbus
Report, AFPTRC TN-55-33, AF 33(038)10528
ASTIA AD-102,675

961. THE EFFECT ON PROBLEM SOLVING OF SUCCESS OR FAILURE AS A FUNCTION OF CUE SPECIFICITY
Rhine, R. J.
February 28, 1955
Stanford University, Calif.
TR 8, N6onr-25125
ASTIA AD-59,305

962. FINITISTIC RATIONAL CHOICE STRUCTURES
Davidson, D. and Suppes, P.
March 4, 1955
Stanford University, Applied Mathematics and Statistics Lab., Calif.
TR 2, DA 04-200-ORD-293
ASTIA AD-59,304

963. EXPERIMENTAL STUDIES OF PROBLEM SOLVING
Taylor, D. W. and McNemar, O. W., Editors
August 31, 1955
Stanford University, Calif.
TR 10, N6onr-25125
ASTIA AD-73,134

Experimental research is reported on the following topics: (1) group vs. individual achievement in solving arithmetic reasoning and spatial relations problems; (2) the effectiveness of a brief interruption of work as a means of overcoming inappropriate sets in problem solving; (3) continuous vs. voluntarily spaced work in problem solving; (4) appraisal of intellectual motivation; (5) transfer as a function of breadth of training; (6) the effect of stimulus redundancy on concept formation; (7) a possible sex difference in the effect of success and failure on problem solving; (8) the effect on problem solving of success and failure; (9) the effect on problem solving of success and failure as a function of level of anxiety; and (10) anagram and puzzle series for the study of set.

964. EFFECT OF ACOUSTIC NOISE ON TIME JUDGMENT
Jerison, H. J. and Smith, A. K.
October 1955
Antioch College, Yellow Springs, Ohio
Report on Human Performance in High Energy Noise Fields, WADC TR 55-358, AF 18(600)50
ASTIA AD-99,641

Fourteen volunteer male undergraduates with normal hearing were asked to press a telegraph key at ten minute intervals while working on another job that kept them almost completely occupied. In a two-hour control session the over-all noise level was about 77.5 db. In another two-hour experimental session the first half hour was in the 77.5 db noise field and the last one and one-half hours were in an over-all noise field of about 111.5 db. The lower noise level served as a measure of performance under "normal" conditions and also to mask extraneous laboratory noises, and the higher noise level provided the experimental condition studied. It was found that under quiet conditions subjects responded about every nine minutes on the average. Under noise conditions subjects responded about every seven minutes. The difference between time judgments in noise and quiet was significant at the 0.02 level. It is concluded that noise affects time judgments as measured in this experiment. The results are discussed in terms of effects of motivation on time judgment and in terms of a neural model for the construction of subjective time involving the normal activity of the central auditory nervous system.

965. MATHEMATICAL MODELS OF HUMAN BEHAVIOR. PROCEEDINGS OF A SYMPOSIUM SPONSORED BY DUNLAP AND ASSOCIATES, INC. AND THE COMMISSION ON ACCIDENTAL TRAUMA, ARMED FORCES EPIDEMIOLOGICAL BOARD
Dunlap, J. W., Editor
Dunlap and Associates, Inc., Stamford, Conn., 1955
DA 49-007-MD-239
ASTIA AD-79,529

Contents: A Group Preference Experiment, by M. M. Flood; Some Problems in Stochastic Learning Models With Three or More Responses, by R. R. Bush; Mathematical Models Applied to Accident Processes, by H. H. Jacobs; Stability: a New Equilibrium Concept, by D. Luce; Norms and Habits of Decision Making Under Certainty, by J. Marschak; The Utility of Wealth, by H. Markowitz; Theory of Elementary Predictive Behavior: and Exercise in the Behavioral Interpretation of a Mathematical Model, by W. K. Estes; On the Multidimensional Analysis of Monotonic Single Stimuli Data, by C. H. Coombs and R. C. Kao; Probability Estimates and Gambling, by E. Jarvik; and An Attempt To Predict Gambling Decisions, by W. Edwards.

966. AN ATTEMPT TO PREDICT GAMBLING DECISIONS
Edwards, W.

In "Mathematical Models of Human Behavior," Dunlap, J. W., Editor
Dunlap and Associates, Inc., Stamford, Conn., 1955, pp. 83–96

The problem of predicting real choices among simple bets is discussed. The concepts used for this kind of prediction are utility (or subjective value) and probability preferences (or subjective probability) and the basic notion is the old idea, originated by Daniel Bernoulli in explaining the St. Petersburg paradox, that subjects choose among bets as if they were maximizing a form of expected utility. (*PsyA*, 1956, #6527)

967. THE OVERLAPPING OF SIGNALS FOR DECISIONS
Mackworth, J. F. and Mackworth, N. H.
1955
Applied Psychological Unit, Cambridge, Great Britain
ASTIA AD-119,043

An attempt was made to understand more fully the problems facing men in situations in which they have to compare quickly many objects presented visually and simultaneously. Human limitations were sought in the rate at which each signal in a continuous series could be accurately matched. The physical measure devised was the index of signal-overlap which is the sum total in seconds of the various periods during which the given signal is overlapped by any other signal. A task in which objects had to be matched confirmed the great disadvantages for skilled achievement when further physical sources of demands for action are added to a serial visual presentation. These difficulties are experienced even when there is no change in the average number of signals presented per unit time. The greatest disadvantage of multichannel displays is their tendency to effect momentary but very damaging peaks of speed-stress; these peaks may pass unnoticed unless the physical situation is analyzed by some measure such as this index of signal-overlap. A linear relationship was demonstrated for the regression of missed signals on signal-overlap: the greater the peak stress, the higher the proportion of failures which are caused by missed rather than wrong decisions. Most of the multichannel effect can be traced to peak speed-stress. Statistical analysis suggested that more display channels may have further effects.

968. PROBLEM-SOLVING AND PERCEPTUAL ORGANIZATION: THE RELATIONSHIP BETWEEN FLEXIBILITY-RIGIDITY IN INTELLECTUAL BEHAVIOR AND (A) FACILITY IN PERCEPTUAL CLOSURE AND (B) PERCEPTUAL ILLUSION. THE APPLICABILITY OF THESE MEASURES AS OBJECTIVE AIDS IN THE DIFFERENTIAL DIAGNOSIS OF MANICS, "NORMALS," AND DEPRESSIVES. HISTAMINE TOLERANCE IN RELATION TO THESE NOSOLOGICAL GROUPS AND INTELLECTUAL AND PERCEPTUAL PARAMETERS
Stein, M.
1955
New York University, N. Y.
Thesis

969. PROBLEM SOLVING AND THINKING
Taylor, D. W. and McNemar, O. W.
***Annual Review of Psychology*, v. 6, pp. 455–482, 1955**

A review of literature for the period July, 1949 to June, 1954 with major sections: concept formation; set, "rigidity," and functional fixedness; individual problem solving; and group problem solving. 165-item bibliography. (The bibliography was also published by Stanford University as a Report, under Contracts Nonr-22502 and N6onr-25125, 1954 and listed by ASTIA as AD-54,847) (*PsyA*, 1955 #5286)

970. LEARNING IN A TWO-CHOICE PROBABILITY SITUATION WITH A PROBLEM-SOLVING SETTING
Goodnow, J. J. and Postman, L.
***Journal of Experimental Psychology*, v. 49, pp. 16–22, 1955**

971. THE PROBLEM OF PROBLEM SOLVING
Humphrey, G.
***Acta Psychologica*, v. 11, pp. 213–214, 1955**

972. THINKING: FROM A BEHAVIORISTIC POINT OF VIEW
Maltzman, I.
***Psychological Review*, v. 62, pp. 275–286, 1955**

A theory of human problem solving has been outlined, based upon the concept of a compound temporal habit family hierarchy, which is assumed to function, at least in part, according to the principles of conditioning and trial and error learning. Some of the characteristics of the compound hierarchy were noted, and its role in different kinds of problem-solving situations was indicated. The systematic status of thinking from a behavioristic point of view was described as a disposition or hypothetical state of the organism. Within the present theory it is equivalent to a new combination of habit strengths produced, primarily, by mediated generalization. 25 references. (*PsyA*, 1956, #2435)

973. STUDIES OF PROBLEM SOLVING
Taylor, D. W.
January 1, 1956
Stanford University, Calif.
Final Report, Nonr-22502
ASTIA AD-82,800

The research consisted of a series of experimental studies concerned with problem solving and thinking and designed to supplement one another. The general purpose was to increase understanding of the fundamental factors and relations involved in the higher mental processes, and hence, to make possible the more effective training of individuals in such processes.

974. RESEARCH ON PROBLEM SOLVING AND CREATIVE THINKING
Taylor, D. W.
January 15, 1956
Stanford University, Calif.
Final Report, April 1, 1950–September 30, 1955, N6onr-25125
ASTIA AD-82,799

Experimental and field studies were conducted on problem solving and creative thinking and on effective training of individuals in such processes. Published reports and reports to be published are listed. A study of the influence of group discussion on creative thinking is still in progress.

975. THE USE OF STATISTICAL DECISION FUNCTIONS IN MAKING PRACTICAL DECISIONS
Edwards, W.
January 1956
Armament Systems, Personnel Research Lab., Lowry AFB, Colo.
Research Report, AFPTRC-TN-56-14
ASTIA AD-124,751

Mathematical methods for calculating expected values are derived in two typical applied situations. In the first, the problem is which of two training methods should be adopted. Various mathematical models, depending on whether knowledge about skills is certain or only probable and on whether or not all people entering into a training course may be assumed identical, are developed. A computational example is given. The second situation is one in which a valid test exists, but the trait tested (or its absence) is rare in the population. It is shown that under some circumstances use of even a valid test for selection purposes decreases the correctness of selection, and an exact criterion for use or nonuse of the test is developed.

976. ANCHOR EFFECTS IN ABSOLUTE JUDGMENTS
Eriksen, C. W. and Hoke, H. W.
January 1956
Johns Hopkins University, Institute for Cooperative Research, Baltimore, Md.
Report on Human Engineering Analysis of Weapon Systems
WADC TR 56-144, AF 33(038)22642
ASTIA AD-94,834

One of the prominent features of discrimination data obtained under the method of absolute judgment is the anchor effects obtained on the ends of the stimulus continuum. Explanations for these anchor effects have been advanced in terms of response attenuation and stimulus generalization. The present paper has presented an alternative explanation which we have termed the subjective standard hypothesis. This hypothesis states that the S when confronted with a series of stimuli in an absolute judgment task, selects certain stimuli that he then uses as standards for judging the remaining stimuli. When a stimulus is presented the S attempts to recall one of these standard stimuli and uses it as a reference in judging the presented stimulus. Two experiments were performed. In the first the Ss were required to absolutely judge a series of hues that formed a circular continuum. The responses consisted of the number series 1–20. Two groups of Ss were used. The groups differed in what response num-

bers were assigned to which hues. The results showed that anchor effects were obtained for this circular continuum and that the discriminability of a hue depended in part upon the response that was assigned to it. These results were at variance with the response attenuation hypothesis and the stimulus generalization hypothesis but were predicted by the subjective standard hypothesis. A second experiment was performed that successfully ruled out an explanation of the results of Experiment I in terms of such response factors as response stabilization and response generalization.

977. TWO RESULTS ON SEMIORDERED MIXTURE SPACES
Luce, R. D.
February 1956
Columbia University, Bureau of Applied Social Research, N. Y.
Technical Report 13 on Behavioral Models Project, Report CU-19-54-Nonr-26621-BASR
ASTIA AD-94,365

A previous study, "Semiorders and a Theory of Utility Discrimination," is continued. Two results are given: The first establishes the conditions under which the "just-preferable-difference" functions associated with an unbounded linear utility function of a semiordered mixture space are constant. The second result establishes that imperfect discrimination, either preference or stimulus, in a mixture space cannot be assumed to derive solely from imperfect stimulus discrimination of the underlying probabilities.

978. ON THE ENUMERATION OF DECISION PATTERNS INVOLVING *n* MEANS
Wine, R. L. and Freund, J. E.
May 14, 1956 (Revised July 6, 1956)
Virginia Agricultural Experiment Station, Blacksburg
TR 24, Reprint Series 86
DA 36-034-ORD-1477
ASTIA AD-144,511

979. DECISION PROCESSES IN COMMUNICATION NETS
Shaw, M. E., Rothschild, G. H., and Strickland, J. F.
May 31, 1956
Johns Hopkins University, Psychological Lab., Baltimore, Md.
Report 166-I-198, N5ori-166, T. O. 1
ASTIA AD-150,504
(See also *Journal of Abnormal and Social Psychology*, v. 54, pp. 323–330, May 1957)

980. INSTRUCTIONS AND ATTACK VARIABILITY IN PROBLEM-SOLVING BEHAVIOUR
Hall, A. C.
June 1, 1956
Navy Electronics Lab., San Diego, Calif.
NEL Technical Memorandum 185
ASTIA AD-107,608

981. INQUIRY INTO THE DECISION PROCESS
Meyer, G. L. and Hoban, C. F.
August 1, 1956
University of Pennsylvania, Institute for Cooperative Research, Philadelphia
Report WE-56-U-M-5, DA 36-039-sc-63143
ASTIA AD-143,932

The decision process is discussed in relation to the design of military communications systems. The problem is presented as that of information required for decision and the criteria of decision with the required information given. The conventional matrix of decision is introduced which includes acts or choices, events over which the decider has no control but which influence the results of decision, the assignment of probabilities to the occurrence of events, and the assignment of values or utilities to the results. The concept of expectation is identified as common to available prescriptive models, or as a means of representing these models. The distinction is made between prescriptive and descriptive models of decision, and the adequacy of prescriptive models for description of decision behavior is discussed from the standpoint of results of experiments.

982. A MODEL OF RISKLESS CHOICE
Adams, E. W. and Fagot, R. F.
August 7, 1956
Stanford University, Applied Mathematics and Statistics Lab., Calif.
Technical Report 4, Nonr-22517
ASTIA AD-103,564

The model is concerned with subjects' choices in pairwise comparisons between alternatives in situations of riskless choice which involve just two components. A class of such two-component choice situations is analyzed in which the individual behaves as though he assigns subjective values to each of the components independently, and then adds the values together to get the value of the composite alternative. That alternative of every presented pair is chosen which has the higher value. When an individual evaluates a composite alternative by adding the separate utilities of each component, he is said to have an additive utility function. The model is formally characterized, and four necessary conditions for the existence of an additive utility function are derived. A theorem is presented which shows that for sets of alternatives of certain fixed finite size, necessary and sufficient conditions for the existence of a utility function can be formulated in terms of certain derived empirical consequences. A decision procedure method is presented for determining whether any finite system of preferences satisfies the additive model. The close formal and empirical connection between additive utility functions and ordered metric scales is pointed out. The additive model generates a partial ordering on utility intervals. Extensions to alternatives of more than two components and to situations involving more than two components and elements of risk are briefly considered.

983. LEARNING, PROBLEM-SOLVING AND AFTER-EFFECTS
Faltheim, A.
Appelbergs Boktryckeri, Uppsala, Sweden, 1956

984. PRESENT ACCOMPLISHMENT AND FUTURE TRENDS IN PROBLEM-SOLVING AND AND LEARNING THEORY
Melton, A. W.
***American Psychologist*, v. 11, pp. 278–281, 1956**

985. A NOTE ON CYBERNETICS AND ANALYTICAL PSYCHOLOGY
Storr, A.
***Journal of Analytical Psychology*, v. 1, pp. 93–95, 1956**

Jung conceives the psyche as a "self-regulating system in which the unconscious functions in a compensatory relationship to consciousness." Jung's idea of the compensatory aspect of the psyche and of its goal-seeking propensities is similar to the explanation of bodily homeostatic mechanisms offered by the modern science of cybernetics. (*PsyA*, 1957, #41)

986. FURTHER TESTS OF THEORIES OF DECISION IN AN "EXPANDED JUDGMENT" SITUATION
Irwin, F. W. and Smith, W. A. S.
***Journal of Experimental Psychology*, v. 52, pp. 345–348, 1956**

"The Ss were shown numbers on cards drawn from large packs in which the means and *SD*s of the numbers varied from pack to pack, and were required to announce when they had decided that the mean of the whole pack was greater than, or less than zero." Results are interpreted as confirming a theory based upon the processes of statistical decision-making but confirm only in part the Cartwright-Festinger theory. (*PsyA*, 1958, #256)

987. THE INFLUENCE OF ATTITUDES ON SYLLOGISTIC REASONING
Henle, M. and Michael, M.
***Journal of Social Psychology*, v. 44, pp. 115–127, 1956**

Criticisms are directed against studies which purport to show the "very limited ability of human beings to reason logically" on the alleged reason that their thinking must reach conclusions which they have previously accepted. Experiments are reported which demonstrate that when unclarified thinking tasks are clarified ability to reason correctly is greatly improved. Accordingly, the authors point out that motivation and cognition are not dichotomous processes and that in reasoning the "result" depends on the "nature of both kinds of process in relation to each other." (*PsyA*, 1959, #3252)

988. THE NATURE OF THE GENERAL REASONING FACTOR
Guilford, J. P., Kettner, N. W., and Christensen, P. R.
***Psychological Review*, v. 63, pp. 169–172, 1956**

It has been much easier to decide what general reasoning is not than to say what it is. "By elimination and

by consistent indications of a positive nature, the best we can say is that general reasoning has something to do with comprehending or structuring problems of certain kinds in preparation for solving them." (*PsyA*, 1957, #4361)

989. **A COMPARISON OF GAME THEORY AND LEARNING THEORY**
Simon, H. A.
***Psychometrika*, v. 21, pp. 267–272, 1956**

It is shown that Estes' formula for the asymptotic behavior of a subject under conditions of partial reinforcement can be derived from the assumption that the subject is behaving rationally in a certain game-theoretic sense and attempting to minimax his regret. This result illustrates the need for specifying the frame of reference or set of the subject when using the assumption of rationality to predict his behavior. (*PsyA*, 1957, #5266)

990. **PATTERNS OF THINKING IN SOLVING PROBLEMS**
Buswell, G. T.
***University of California, Public Education*, v. 12, no. 2, pp. 63–148, 1956**

The study reported in this monograph is concerned with the mental operations of a group of subjects during the process of solving a problem. The method is primarily observational and analytical. The aim is to obtain evidence of individual patterns of thinking of a kind that will permit objective descriptions. The study is not experimental; it is not a comparison of controlled groups; it does not assume that the sample of subjects studied is typical of the general population. The purposes are, first, to develop a technique by which patterns of thinking may be compared objectively, and second, to add to the sum of knowledge regarding the nature of the problem-solving process. It is hoped that the findings will be of value to the schools in their attempt to "teach students to think."

There is an eight-page appendix of the actual problems used in the study. (*PsyA*, 1957, #7406)

991. **STIMULUS-RESPONSE COMPATIBILITY, INFORMATION THEORY, AND PERCEPTUAL-MOTOR PERFORMANCE**
Deininger, R. L. and Fitts, P. M.
In "Information Theory in Psychology," Quastler, H., Editor
The Free Press, Glencoe, Ill., 1956, pp. 316–349

Stimulus-response compatibility is a concept which considers relations among concurrent stimulus and motor activities. Relative compatibility of any particular task is defined as the ratio of the actual rate of information transferred to the maximum rate for that task. While these maximum rates cannot always be specified, application of the compatibility concept is important in task specification and analysis. (*PsyA*, 1957, #2878)

992. **ELEMENTS OF A THEORY OF HUMAN PROBLEM SOLVING**
Newell, A. and Shaw, J. C.
March 4, 1957
RAND Corp., Santa Monica, Calif.
P-971
(See also *Psychological Review*, v. 65, pp. 151–166, 1958)

The theory postulates a control system consisting of a number of memories, a number of primitive information processes which operate on the information in the memories, and a perfectly definite set of rules for combining these processes into whole programs of processing. The relation to digital computers is explained.

993. **PROBLEMS SOLVABLE BY A CHEMICAL MACHINE WITH A LARGE, LONG-LIFE STORAGE, AND THE POSSIBILITY OF ITS DEVELOPMENT INTO A CHEMICAL, INFORMATION-LOGIC MACHINE**
Serpinskii, V. V. and Vleduts, G. M.
Technical Conference held May 28–31, 1957 at the Electromodelling Laboratory of the USSR Academy of Sciences
Report I. Plenary Sessions

994. **AN ANALYSIS OF STIMULUS VARIABLES INFLUENCING THE PROPRIOCEPTIVE CONTROL OF MOVEMENTS**
Bahrick, H. P.
June 6, 1957
Ohio State University Research Foundation, Aviation Psychology Lab., Columbus
Report, AFPTRC TN-58-11, AF 41(657)70
ASTIA AD-152,129

995. AN ORDERED METRIC MODEL OF INDIVIDUAL CHOICE BEHAVIOR
Fagot, R. F.
September 12, 1957
Stanford University, Applied Mathematics and Statistics Lab., Stanford, Calif.
TR 13, Nonr 22517
ASTIA AD-142,792

A discussion is presented of individual choice behavior which leads to an ordered metric scale of subjective value or utility. The basic notion on which the given model is based is a quaternary relation Q, which is interpreted such that $xyQzw$ holds when the difference in utility between x and y is greater than the difference in utility between z and w. The model is formally characterized and some of the empirical consequences of the basic assumption of the model are derived. These consequences are utilized to define weaker alternative models which can be compared theoretically and experimentally. Of primary interest is the weak-ordered metric model which is defined by precisely four simple empirical consequences of the strong assumption, its salient feature being that satisfaction of its axioms is sufficient to generate an ordered metric scale. The use of the method of triads, in conjunction with the method of pairs, is analyzed as a technique of deriving a utility scale, and the ordinal method is defined. An index of predictive power of a model is shown to be the ratio of the maximum number of predictions a model makes to the minimum number of independent observations required to make these predictions. The predictive power is then a function of the number of alternatives. Alternative models are compared in terms of this concept. The given model is compared to other methods of measuring utility on an interval scale, or an ordered metric scale, and to a model of riskless choice developed by Adams and Fagot.

996. EXPECTANCY EVALUATION AS AN AID TO DECISION MAKING
Prichard, A. C.
November 1, 1957
Army Signal Engineering Labs., Fort Monmouth, N. J.
Technical Memo M-1929
ASTIA AD-160,054

A method is described for deriving a measure of the degree of certainty with which human reactions to a given situation may be anticipated. This method of situation evaluation is intended to supply a logical and quantitative foundation upon which decisions can be based. Techniques are outlined for breaking down a complex situation into simpler aspects. Division of work into sub-tasks enables a changing situation to be analyzed continuously. The range of situations which may be evaluated by this method extends from personal to national.

997. INTERDEPENDENCE OF SUCCESSIVE JUDGMENTS. I. COMPARATIVE JUDGMENT. II. AFFECTIVE JUDGMENT. III. ABSOLUTE JUDGMENT
Willingham, W. W.
July 31, 1957
Naval School of Aviation Medicine, Pensacola, Florida
Report 2, Project NM 14 02 11
ASTIA AD-154,615

Interdependence of successive judgments was investigated in the context of comparative, affective and absolute judgment. The findings were as follows: (1) In a two-choice situation involving sub-threshold and supra-threshold discrimination, both alternation and repetition biases were found; (2) No alternation or repetition bias was found in a two-choice affective judgment situation; (3) Numerical ratings tended to be biased in the direction of the previous ratings but this was mitigated by instructions to the subject. Methodological and theoretical implications of these results were discussed.

998. WHAT IS THE HUMAN SUBJECT RESPONDING TO IN A TWO-CHOICE TASK?
Goodnow, J. J., Shanks, B., et al.
1957
Walter Reed Army Institute of Research, Washington, D. C.
WRAIR Problem-Solving Project, Memo No. 3

999. A RATE OF MAKING COMPLEX DECISIONS
Chapanis, A.
***American Journal of Psychology*, v. 70, pp. 650–652, 1957**
(See also Johns Hopkins University Report 166-I-208, N5ori-16601, 1958, ASTIA AD-217,773)

The time required to classify 1200 references, selected from a larger list of 10,000 items, into 89 categories for a

bibliography was found to be 7.35 sec/card and 6.93 sec/card for the first and second 100 cards respectively. These data were taken after about ½ the total of 10,000-item task was completed and therefore represent the rate for a highly practiced S. (*PsyA*, 1959, #3104)

1000. COMMENT ON THE INFORMATION IN COMPLEX DECISIONS

Newman, E. B.
***American Journal of Psychology*, v. 70, pp. 652–653, 1957**

The comment deals with the problem of the input-output relationship in such decision-making as Chapanis reports. (*PsyA*, 1959, #3057)

1001. THE ACQUISITION AND APPLICATION OF INFORMATION IN THE PROBLEM SOLVING PROCESS: AN ELECTRONICALLY OPERATED LOGICAL TEST

John, E. R. and Miller, J. G.
***Behavioral Science*, v. 2, pp. 291–301, 1957**

1002. PROBLEM SOLVING

Polanyi, M.
***British Journal for the Philosophy of Science*, v. 8, pp. 89–103, 1957**

Problem solving tends to fall into two stages, "a first stage of perplexity, followed by a second stage of doing and perceiving which dispels this perplexity." The choice of a problem should anticipate something hidden yet something accessible in the light of the investigator's talents and which is reasonable to hope for in view of the cost in terms of labor, money, and talent. Several heuristic factors enter into the discoveries made in natural science, technology, and mathematics. Of these, preoccupation with a problem is perhaps the most significant. The satisfier of our heuristic cravings is an idea not yet conceived. (*PsyA*, 1959, #772)

1003. THE SOLVING OF THREE-TERM SERIES PROBLEMS

Hunter, I. M. L.
***British Journal of Psychology*, v. 48, pp. 286–298, 1957**

Sixteen problems of the three-term series type are presented to each of 64 11-year-old children and 32 16-year-olds. The older children show evidence of solving these problems by articulated sequences of analytical judgments which accord with the varying logical structures of the problems, show no influence of atmosphere effect, and show marked practice effects. The results are interpreted as demonstrating that increasing age brings increasing appreciation of the structural characteristics as such, together with increasing skill in dealing with serial relations which are progressively more remote from the perceptual-motor level of behavior. (*PsyA*, 1959, #5699)

1004. OPTIMUM DECISION FEEDBACK SYSTEMS

Harris, B., Hauptschein, A., and Schwartz, L. S.
***IRE Convention Record*, v. 5, Part 2, Information Theory, pp. 3–10, 1957**

1005. PROBLEM SOLVING IN MULTIPLE-GOAL SITUATIONS

Anderson, S. B.
***Journal of Experimental Psychology*, v. 54, pp. 297–303, 1957**

Number of plausible goals with which S was faced was introduced as the independent variable in a human problem solving task. The results, interpreted in terms of interference between responses oriented toward competing goals, indicate that number of solutions is an inverse function of number of goals, sequential probabilities of problem-solving steps are a function of the number of goals as is the number of Ss engaging in redundant activity. (*PsyA*, 1959, #594)

1006. MINIMUM COST DECISION-FEEDBACK SYSTEMS FOR DETECTING SIGNALS PERTURBED BY ADDITIVE GAUSSIAN NOISE

Harris, B., Hauptschein, A., and Schwartz, L. S.
***Operations Research*, v. 5, pp. 680–692, 1957**

In a binary system, signals may be recorded at the receiver as present, absent, or decision withheld when doubtful. In the latter case, interpretation may be provided through coded artificial constraint, or the receiver may require the signal to be repeated–the method of decision feedback. The paper develops decision-feedback system theory to specify optimum conditions in a least cost sense, and demonstrate that the decision-feedback method is more efficient in terms of power, bandwidth, and time. (*PsyA*, 1959, #296)

1007. LEVEL OF ASPIRATION AND DECISION MAKING
Siegel, S.
***Psychological Review*, v. 64, pp. 253–262, 1957**

The level of aspiration can be related to decision theory where an achievement scale is viewed as a scale of utility of achievement goals. One's level of aspiration can be reduced to the measurement of ordered metric goals which include a ranking of the goals and the distance between them. A behavioral model of decision making should contain not only subjective probability but also utility whose main concepts are *LA* and reinforcement effects. Given several choices the individual tries to maximize the subjective expected utility where utility is a function of *LA* and reinforcement. Experimental evidence supporting these ideas is given. (*PsyA*, 1959, #587)

1008. CONTRIBUTIONS TO THE STUDY OF THE PROBLEM-SOLVING PROCESS
John, E. R.
***Psychological Monographs: General and Applied*, v. 71, no. 18, pp. 1–39, 1957**

The utilization of a new approach to problem-solving in which the S is provided "with a standard minimum of information about a problem and then require him to structure his own pre-solution behavior with a minimum of externally imposed constraint" is attained in part at least in the "Problem-Solving and Information Apparatus" (PSI) used in this study. Utilizing this electro-mechanical Boolean computer, the investigator studied problem-solving behavior in 59 University of Chicago students and staff members. He reports on significant differences in performance related to the disciplines from whence the Ss are obtained, the stage of training and education they have attained, personality factors, etc. (*PsyA*, 1959, #3152)

1009. GAMES AND DECISIONS
Luce, R. D. and Raiffa, H.
John Wiley & Sons, Inc., New York, N. Y., 1957

1010. A PSYCHOLOGICAL STUDY OF PROBLEM SOLVING
van de Geer, J. P.
De Toorts, Haarlem, Netherlands, 1957

The subject of this book is the psychological activity by which a subject tries to solve a problem. The first chapter deals with the introspective study of thought processes, as represented by the Würzburg school; the second with the Gestalt psychological study of problem solving. In the third, the nature and operation of Einstellung effect is discussed in detail. The fourth chapter comprises the outline of a phenomenological theory of problem solving, and the fifth one attempts at an axiomatic approach, introducing some psychological notions into an axiomatic system influenced by von Neumann's Theory of Games. 17 references. (*PsyA*, 1958, #1339)

1011. THE APPROPRIATE MATHEMATICAL TOOLS FOR DESCRIBING AND ANALYZING UNCERTAINTY
Shackle, G. L. S.
In "Uncertainty and Business Decisions," University Press, Liverpool, 1954 (Second Edition, 1957) Chapter 3

1012. RATIONAL CHOICE AND THE STRUCTURE OF THE ENVIRONMENT
Simon, H. A.
In "Models of Man: Social and Rational," John Wiley & Sons, Inc., New York, N. Y., 1957

1013. PERCEPTION OF THE STATISTICAL STRUCTURE OF GROUPED EVENTS
Seaquist, M. R.
January 1958
University of Texas, Austin
Thesis
ASTIA AD-154,991

Several aspects of statistical decision theory were investigated. Five general hypotheses concerning the ability of human subjects to perceive the underlying statistical structure of sequential events were tested. These hypotheses were derived from a pilot study and from the theory of statistical decision functions. The performance of two randomly assigned groups of 25 subjects each was compared on a questionnaire and on two specially constructed sequences containing two discrete events. A mathematical criterion of accuracy was utilized for purposes of evaluation of performance. The results of this study suggest that theories of decision making which assume complete rationality and accuracy of subjects should consider the irrational overconfidence and susceptibility to error in estimating frequency of variable stimulus-objects.

1014. FLEXIBILITY IN INTELLECTUAL PERFORMANCE
Wand, B.
April 1958
Educational Testing Service, Princeton, N. J.
Thesis
Nonr-69400
ASTIA AD-156,703

An attempt is made to extend the study of individual difference in flexibility into the area of problem-solving. For the purpose of this study, flexibility is defined as the ability to devise new methods of solving problems when familiar methods are less appropriate, and to reject an experimentally induced set when the set does not contribute to solving a problem, or to reject an assumption when that assumption does not contribute to solving a problem. Tests to measure flexibility and a set of ability tests closely parallel in content to the flexibility tests were administered to a group of high school students selected primarily from college preparatory courses. Analysis of the data indicated that the results do not support the concept of a general factor of flexibility in problem-solving. Although the flexibility tests do not function as alternate tests of ability, they do relate highly to each other, even in the same content area. The ability tests show higher relationships with the personality variables. It was suggested that the most profitable move may be to relinquish the concept of flexibility as an ability and to conceive of it as a manner of approach to a problem affecting the capacity for new learning.

1015. EXPERIMENTAL ANALYSIS OF PROBLEM SOLVING BEHAVIOR
Kendler, H. H.
May 15, 1958
New York University, N. Y.
Periodic Status Report, Nonr-28530
ASTIA AD-212,276

1016. A COMMAND STRUCTURE FOR COMPLEX INFORMATION
Shaw, J. C., et al.
1958
Proceedings of the Western Joint Computer Conference, Los Angeles, Calif., May 1958
American Institute of Electric Engineers, New York, N. Y.

1017. RATIONAL CHOICE FUNCTIONS AND ORDERINGS
Arrow, K. J.
July 25, 1958
Stanford University, Calif.
TR 58, N6onr-25133
ASTIA AD-201,235

An analysis is made of the demand-function (as used in the theory of consumers' demand) from the point of view that the range over which the choice functions are considered should be broadened to include all finite sets. The analysis shows the complete equivalence of the weak axiom of revealed preference with the existence of an ordering from which the choice function can be derived. This equivalence is demonstrated by very elementary means provided choices are definable from finite sets as well as budget constraint sets.

1018. THE PROCESSES OF CREATIVE THINKING
Newell, A., Shaw, J. C., et al.
September 16, 1958 (Revised January 28, 1959)
RAND Corp., Santa Monica, Calif.
Paper 1320 Presented at Symposium on Creative Thinking, University of Colorado, Boulder, May 16, 1958

The question of whether a theory of creative thinking distinct from a theory of problem solving is needed is presented and discussed. What has been learned about problem solving by simulating certain human problem solving processes with digital computers is summarized. Some of the differences in degree that might be observed in comparing relatively creative with relatively routine problem solving are indicated.

1019. ON THE SPAN OF A SEARCH MECHANISM IN PROBLEM SOLVING
Ray, W. S.
December 1958
Bethany College, West Va.
TR 1, Nonr-231500
ASTIA AD-208,022

1020. ASPECTS OF PILOT DECISION MAKING
Williams, A. C., Jr. and Hopkins, C. O.
December 1958
Hughes Aircraft Co., Culver City, Calif.
Report, WADC TR 58-522, AF 33(616)5135
ASTIA AD-209,382

A detailed analysis was made of the tasks performed by the pilot of a modern airborne weapon system. The results of this analysis were coded and presented in diagrammatic form to show alternative courses of action that may result in successful completion of a mission phase. Instances of pilot decision making were identified and a way of conceptualizing decision making so as to encompass these instances was proposed. The more prominent decision theories were reviewed briefly and the applicability of each theory to the problem of pilot decision making was considered. Problem areas requiring experimental study were discussed and some approaches to the study of these problems were suggested.

1021. AN ACTUARIAL APPROACH TO CLINICAL JUDGMENT
Hunt, W. A.
1958
Northwestern University, Evanston, Ill.
Report, N7onr-45011
ASTIA AD-159,622

The nature of clinical judgment was examined via the actuarial approach, an approach which is firmly associated with the experimental tradition whereby orderly, repetitive data which lend themselves to nomothetic treatment can be produced. Several reliability studies were conducted which show high reliability or good inter-judge agreement within the limits of the rating technique and particular situation employed. Some of the factors which cause distortion in judgment were investigated. The specific area was the effect upon judged value of the stimulus of the context in which it appears. Results confirmed the hypothesis that median stimuli are judged higher when presented in a context of low stimuli and lower when presented in a high context.

1022. NOTES ON A CONSTRUCTIONAL FRAMEWORK FOR A THEORY OF ORGANIZATIONAL DECISION MAKING
Rudner, R. S. and Wolfson, R. J.
1958
University of New Mexico, Albuquerque
Report, AFOSR TN-58-1116, AF 49(638)33
ASTIA AD-207,842

A preliminary treatment is given of the study of the construction of a definitional framework of concepts held to be pivotal in any adequate theory of organizational decision making. The definitional framework is comprised of 91 definitions, grouped into four related categories. The categories are: (1) a pool of preliminary concepts, (2) decision behavior, (3) conflict and cooperation, and (4) decision making in organizations. The number of extra-logical primitive terms indigenous to the behavioral sciences is minimized in favor of terms which have received explication in physical science.

1023. BY-PRODUCTS OF AVERSIVE CONTROL
Sidman, M.
1958
Walter Reed Army Institute of Research, Washington, D. C.
ASTIA AD-219,825
(See also *Journal of the Experimental Analysis of Behavior*, v. 1, pp. 265–280, August 1958)

1024. INFORMATION, AFFECTIVITE, INDIVIDU CONTRE GROUPE DANS LA RESOLUTION DE PROBLEMES (INFORMATION AND AFFECTIVITY, INDIVIDUAL VS. GROUP, IN PROBLEM SOLVING)
Oléron, P.
***Année psychologique*, v. 58, pp. 93–106, 1958**

Three major themes appear in the literature: the role and modalities of information, the influence of affective factors, and the effectiveness of group activity. Of these, only the first is new. Twenty-seven studies are reviewed, two of them from British, 25 from American journals. (*PsyA*, 1959, #9908)

1025. VISUAL SEARCH FOR SUCCESSIVE DECISIONS
Mackworth, N. H. and Mackworth, J. F.
***British Journal of Psychology*, v. 49, pp. 210–221, 1958**

When a situation provides information from many different independent sources difficulties arise even when the decisions required are simple. In two experiments involving different conditions human Ss repeatedly had to pick out the appropriate objectives from a mass of visual detail and then make simple decisions. It was shown that the percentage of errors is proportional both to the required speed and to the display load. In the

discussion the effects of different sources of information in a moving display are considered in relation to the display load and to the temporal irregularity of successive decisions. (*PsyA*, 1959, #9598)

1026. THE MEDIATING ROLE OF NEED-RELATED CUES IN PROBLEM SOLVING
Kaufman, A. E. (Ohio State University, Columbus, 1957, Thesis)
***Dissertation Abstracts*, v. 18, pp. 1106–1107, 1958**

1027. THE ACQUISITION AND UTILIZATION OF INFORMATION IN PROBLEM SOLVING AND THINKING
Kochen, M. and Galanter, E.
***Information and Control*, v. 1, pp. 267–288, 1958**

A discussion of the distinction between actions directed at acquisition of information, and actions exploiting for gain already acquired information, is given. A subject is presented with a periodic binary sequence and for each term may either: (1) pay for being told what its value is, (2) bet on its value (without however, being told the outcome until the very end), or (3) bet on the whole sequence, different payoffs being assigned to the cases. Several kinds of strategies are discussed informally. There is then some discussion of ways in which one might program a machine to make such decisions, e.g., the machine might remember the n-games which have occurred and use them until they fail (then using longer ones). This scheme is related to the "inductive inference" schemes proposed by Solomonoff (*IRE Convention Record*, v. 5, pp. 56–62, 1957). Some preliminary experiments on human subjects are reported.

1028. TIME SHARING AS AN INDEX OF AUTOMATIZATION
Bahrick, H. P. and Shelly, C.
***Journal of Experimental Psychology*, v. 56, pp. 288–293, 1958**

"Concurrent performance of a visual and an auditory serial reaction task was measured at three stages of practice of the visual task, and for four versions of the visual task differing in degree of redundancy of the stimulus sequence.... It was found that the interference effects due to time sharing of the two tasks varied inversely with the degree of redundancy of the visual task." It is concluded that redundancy permits a change from exteroceptive to proprioceptive control of responses and is a useful index of automatization. (*PsyA*, 1959, #9491)

1029. CONCEPT IDENTIFICATION AS A FUNCTION OF COMPLETENESS AND PROBABILITY OF INFORMATION FEEDBACK
Bourne, L. E., Jr. and Pendleton, R. B.
***Journal of Experimental Psychology*, v. 56, pp. 413–420, 1958**

There was a relatively constant difference between the incomplete and the complete feedback groups in performance at all levels of task complexity. There was an inverse linear relationship between errors and feedback probability. Performance decreased linearly with increased irrelevant information. These findings discussed in terms of Restle's model for discrimination learning. (*PsyA*, 1959, #9782)

1030. SOME SUGGESTIONS FOR THE CONCEPTUAL AND THEORETICAL ANALYSIS OF COMPLEX INTERVENING VARIABLES IN PROBLEM-SOLVING BEHAVIOR
Marx, M. H.
***Journal of General Psychology*, v. 58, pp. 115–128, 1958**

Suggestions are offered for the operational and dimensional analysis of problem solving, the representation of implicit thinking responses, "and for the conceptual and theoretical analysis of complex intervening variables through a process of progressive differentiation of *S* and *R* components and their relations." This approach is contrasted with that of Hull's. 29 references. (*PsyA*, 1959, #9906)

1031. THE THEORETICAL INTERPRETATION OF ERRORS IN SYLLOGISTIC REASONING
Richter, M. N., Jr.
***Journal of Psychology*, v. 43, pp. 341–344, 1958**

This is an analytical and theoretical discussion of errors in syllogistic reasoning, based on errors in classifying and in reasoning. Discussion centers about reasoning correctly beyond chance by adherence to a particular nonlogical criterion or by the domination of one particular concept. To avoid errors one must both differentiate

"logical validity" from all other characteristics of syllogisms and classify syllogisms consistently in terms of this criterion. (*PsyA*, 1959, #5708)

1032. HEURISTIC PROBLEM SOLVING: THE NEXT ADVANCE IN OPERATIONS RESEARCH
Simon, H. A. and Newell, A.
***Operations Research*, v. 6, no. 1, pp. 1–10, 1958**

1033. A SIMPLIFIED MODEL FOR STIMULUS DISCRIMINATION
Green, E. J.
***Psychological Review*, v. 65, pp. 56–63, 1958**

A particular examination of the S′ peak from the standpoint of the extension of the Estes-Burke statistical learning theory supposes the peak to be generated by simultaneous additive and subtractive processes working upon response probabilities associated with stimulus elements within and outside the intercept of the S and S′ subsets. Certain exact experimental predictions are made and examined, and some questions concerning its use in developing a program of research are raised as it compares with other current approaches. In the light of available evidence, extensions are suggested for broadening the scope of the present analysis. (*PsyA*, 1959, #3133)

1034. BINARY SYMMETRIC DECISION FEEDBACK SYSTEMS
Harris, B. and Morgan, K. C.
***Transactions of the AIEE*, Part 1, v. 77, no. 38, pp. 436–443, September 1958**

General expressions for information rate and error probability of systems when feedback process is error-free; schemes in which decision process is made on coded word groups as well as on digit-by-digit basis; decision processes considered are those based on single parity check redundancy, as well as on null zones at receiver; cases in which information rate and error probability may be improved. (*EI*, 1958)

1035. A QUANTIFICATION OF PERFORMANCE IN A LOGICAL TASK WITH UNCERTAINTY
Rapoport, A.
Symposium on Information Theory in Biology, Pergamon Press, New York, N. Y., 1958

1036. PROBLEM SOLVING AND THE PERCEPTION OF PERSONS
Moore, O. K.
In "Person Perception and Interpersonal Behavior," Tagiuri, R. and Petrullo, L., Editors Stanford University Press, Calif., 1958, pp. 131–150 (See also *Journal of Symbolic Logic*, v. 24, no. 1, p. 86, 1959)

1037. DECISION-MAKING. AN ANNOTATED BIBLIOGRAPHY, 1958
Wasserman, P. and Silander, F. S.
1958
Cornell University, Graduate School of Business and Public Administration, Ithaca, N. Y.

This volume is designed to provide a carefully selected and annotated list of books, articles, and documents which will serve as a general and broadly conceived introduction to the study of decision-making. The period covered is primarily that from 1947 through September, 1957. Only English language publications are included. A complete author and title index is included. The major classifications are: the decision-making process (general and theoretical), values and ethical considerations, leadership as a factor, psychological factors, decision-making in small groups, community decision-making, communications and information handling, mathematics and statistics in decision-making.

1038. CODING AND USE OF INFORMATION IN PROBLEM SOLVING
Glanzer, M.
September 1, 1958–January 31, 1959
Maryland University, College Park
Progress Report, DA 49-007-md-1004
ASTIA AD-210,077

The theoretical basis for a program of research on the role of information processing in human problem solving is outlined. On the basis of this approach and preliminary empirical work, a series of experiments have been started on the determinants of "set" in problem solving and the role of coding preferences in verbal learning. An experiment on the effect of massing of trials upon development of set in problem solving was completed with results that agree in general with those of previous studies. Some additional data collected in the course of the experiment

indicate that the major effect of massing in producing set may be restricted to those items that immediately follow the massed condition.

1039. A NEW METHOD FOR DISCOVERING THE GRAMMARS OF PHRASE STRUCTURE LANGUAGES
Solomonoff, R. J.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 285–290

1040. ON THE INFLUENCE OF CONGRUITY ON THE SEARCH MECHANISM IN PROBLEM SOLVING
Ray, W. S.
July 1959
Bethany College, W. Va.
TR-2, Nonr-231500
ASTIA AD-219,081

The relationships which are the object of problem solving hold between two or more elements. Those elements which the problem solver considers first may be called congruous. Several conditions making for congruity are suggested, and three experiments investigating those conditions are described. The first experiment showed effects of cultural habits and of a bias produced by instructions, but failed to show any effect of visible similarity, or of familiarity with elements as occurring in pairs. The latter two variables appeared in a second experiment, but the first two disappeared. The third experiment attempted to make nonsense syllables similar by giving them similar meanings, and then transferred these syllables to an apparatus task to see whether the meanings would affect the order in which Ss used the switches of the apparatus. They did not do so.

1041. CAREFUL: A PILOT STUDY OF THE EFFECTS OF HEAVY TARGET LOAD ON HUMAN AND AUTOMATIC DECISION MAKERS
Sinaiko, H. and Cartwright, G. P.
September 1959
University of Illinois, Coordinated Science Lab., Urbana
Report R-115, DA-36-039-SC-56695

The hypothesis that very heavy target loads would adversely affect a human tactical decision-maker while the same number of targets would not degrade the performance of an automatic system was investigated.

1042. IS IT POSSIBLE TO MEASURE THE CONTRAST ENHANCEMENT OF A FIGURE WITH QUASI PERCEPTIVE CONTOURS?
Mori, G. F.
1959
Istituto Nazionale di Ottica, Florence, Italy
Report, AFOSR TN-59-777, AF 61(052)80
ASTIA AD-220,032

1043. EVALUATING INTELLIGENCE FOR PROGRAMMING SYSTEMS
Bemer, R. W.
***Automatic Control*, v. 10, no. 4, p. 22, April 1959**

Typical "intelligence questions" for computers are listed, in processor and supervisor categories. The article describes the attempt being made to systematically classify the various devices for "educating the computer" to take over "the decision-making functions of one or many" human beings. (*C&A*, July 1959)

1044. NERVE CELL RESEARCH URGED FOR "DECISION-MAKING" GUIDANCE
Judge, J. F.
***Missiles and Rockets*, v. 5, no. 39, p. 85, September 21, 1959**

1045. AN INVESTIGATION INTO, AND SPECULATIONS ABOUT, THE FORMAL NATURE OF A PROBLEM-SOLVING PROCESS
Gyr, J. W.
***Behavioral Science*, v. 5, no. 1, pp. 39–59, January 1960**

Problem solving is here viewed as a process in which a person constructs a population of possible hypotheses about his environment, selects one of a few of these for testing, submits it to a test, receives information from the environment regarding the truth or falsity of the hypothesis tested, adjusts his population of possible hypotheses in the light of the available evidence, selects a new hypothesis, and so on, until he has created some

"fit" between his guesses about the environment and his experience in it. The question raised in this paper is whether among the "population" of hypotheses available to the subject, certain ones will be given preference and so chosen before the others. It seems such biases do operate and can be detected.

1046. COMMITMENT
Roby, T. B.
***Behavioral Sciences*, v. 5, no. 3, pp. 253–264.**
July 1960

The Theory of Games has stimulated a study of human decision-making. An attempt is made to show that if special discrepancies between Game Theory assumptions and real life observations can be pinpointed, it may be possible to define auxiliary concepts that will bridge the gap. Such concepts may later be integrated with the Theory of Games into a unified framework for decision-making behavior.

1047. ORDER OF CONSIDERATION OF DIFFERENT TYPES OF CONCEPTS
Hunt, E. B. and Hovland, C. I.
***Journal of Experimental Psychology*, v. 59, pp. 220–225, 1960**

1048. PERFORMANCE OF INFANT RHESUS MONKEYS ON DISCRIMINATION, LEARNING, DELAYED RESPONSE, AND DISCRIMINATION LEARNING SET
Harlow, H. F., Harlow, M. K., Rueping, R. R., and Mason, W. A.
***Journal of Comparative and Physiological Psychology*, v. 53, pp. 113–121, April 1960**

1049. PROBLEMS OF CYBERNETICS, VOLUME I
Lyapunov, A. A., Goodman, R., and Booth, A. D., Editors
Pergamon Press, New York, N. Y., 1960

Problems of Cybernetics will be published only occasionally. The journal will include original scientific work, review articles, and translations of papers concerned with different branches of cybernetics.

INFORMATION THEORY

1050. LA CYBERNETIQUE: THEORIE DU SIGNAL ET DE L'INFORMATION
de Broglie, L., Editor
Seminar, April–May 1950
Editions de la revue d'optique theorique et instrumentale, Paris, 1951

1051. INFORMATION IN THE HEAD
McCulloch, W. S.
Paper presented at 7th Annual Conference on Current Trends in Psychology, University of Pittsburgh, February 20–21, 1953
University of Pittsburgh Press, Pa.

The coding in the central nervous system which is related to perception in vision, acceleration (vestibular), smell, and touch, is discussed in terms of neural physiology and anatomy. It is proposed that the amount of information that can be passed through a given synapse is limited by pulse-interval modulation rather than by all-or-none coding. (*PsyA*, 1955, #200)

1052. THEORY OF INFORMATION: THE BASIC THEOREMS ON SYSTEM UNCERTAINTY
Samson, E. W.
November 1953
Air Force Cambridge Research Center, Bedford, Mass.
AFCRC Technical Report 53-37, E-5102
ASTIA AD-25,851

The principal theorems concerning system uncertainty (Shannon's entropy) are demonstrated on the scientific basis developed in Fundamental Natural Concepts of Information Theory, AFCRC Report E5079, 1951. Formulas and theorems are presented, proved, and related to form a systematic development exhibiting structural relations in simple order with a complete notation scheme based on the calculus of classes. A partial uncertainty function is introduced as a useful structural element.

1053. ESSAYS ON THE USE OF INFORMATION THEORY IN BIOLOGY
Quastler, H., Editor
University of Illinois Press, Urbana, 1953

1054. INFORMATION THEORY: QUESTIONS AND UNCERTAINTIES
Samson, E. W.
January 1954
Air Force Cambridge Research Center, Bedford, Mass.
AFCRC Technical Report 54-1, E-5107
ASTIA AD-28,403

An extension is made of the basic conceptual and theoretical development of information theory by evolving a theory of questions and uncertainties concerning observations on specified objective systems. A collective of experience is assumed for experiments on a typical objective system, and phenomena of the system are represented by classes of experiments in a class diagram. The basic element in the theory is an event transition which defines the progress of events or information. Associated with it is the basic element of a theory of questions, a simple query, asked from a given standpoint or state of knowledge, demanding affirmative but rejecting negative answers. Its uncertainty is the surprisal of the associated transition, and is called a transition uncertainty. Complex questions are functions of a number of simple queries, each of which may be asked from a different standpoint, and several of which may be simultaneously answerable. The establishment of a general question function that defines the questioner's demand for answers and the influence of his experience on his expectations or uncertainties involves two combing operations which yield an argument in a higher function, of degree equal to the number of alternatives. An equipartition law is necessary to define expectations where several components may be answerable for some experiment. The transition uncertainty is a special case, as is the system uncertainty commonly dealt with as Shannon's entropy. The general case, where overlapping alterna-

tives are covered, is new, and an example of a problem involving this feature is included.

1055. THE RELATION BETWEEN UNCERTAINTY AND VARIANCE
McGill, W. J.
Proceedings of the 1954 Conference on Test Problems, Educational Test Service, 1955, pp. 37–42

Information theory is a source of analogies and ideas that might not have occurred to one if problems were considered in another way. Perhaps the analogies are helpful, perhaps not. The theory is concerned with transmitting symbols despite noise. Information measures are concerned with the arithmetic of mean-log-probability. (*PsyA*, 1956, #953)

1056. TSUSHIN RIRON NI TSUITE (ON THE MATHEMATICAL THEORY OF COMMUNICATION)
Takada, Y.
***Japanese Journal of Psychology*, v. 25, pp. 110–117, 1954 (in Japanese)**

Shannon's theory of communication and information measurement is introduced with a brief review of its application in psychology. (*PsyA*, 1956, #967)

1057. PROCEEDINGS OF THE WESTERN JOINT COMPUTER CONFERENCE
March 1–3, 1955
Institute of Radio Engineers, New York, N. Y.

Papers presented at the March 1955 Western Joint Computer Conference included in this publication relate information concerning analog and digital machines and the potential use of this type of automatic data processing equipment.

1058. A BIBLIOGRAPHY OF INFORMATION THEORY (COMMUNICATION THEORY–CYBERNETICS)
Stumpers, F. L.
***IRE Transactions of the Professional Group on Information Theory*, v. IT-1, no. 2, pp. 31–47, September 1955**
(See also ASTIA AD-107,625)

1059. AN INTRODUCTION TO INFORMATION THEORY, WITH REFERENCE TO THE HUMAN OPERATOR
Draper, J.
1955
Clothing and Equipment Physiological Research Establishment, Great Britain
ASTIA AD-73,361

Certain fundamental aspects of the theory of selective information are outlined, and a review is given of experiments involving discrete tasks in which the human subject is considered as the channel of a communication system. Formulas are derived for determining the average amount of information per message (the entropy) and the rate of transmission of information. The correspondence between this latter measure and other measures of agreement is indicated. The rate of information transmission is of an inconvenient form for algebraic treatment, but it is considered of fundamental interest in finding the capacity of a human channel.

1060. A NOTE SUPPLEMENTARY TO "AN INTRODUCTION TO INFORMATION THEORY, WITH REFERENCE TO THE HUMAN OPERATOR"
Draper, J.
1955
Clothing and Equipment Physiological Research Establishment, Great Britain
ASTIA AD-73,362

A formula is given for expressing the means of the sample entropy (I) with the use of sample probabilities of message occurrence ($p_i s$). The sample entropy is a biased estimate of the population entropy. Because of the possibility of the formula giving the expectation of I to be negative, the limits within which the formula for the bias is applicable need further investigation. In particular, the formula cannot be applied when any $p_i = 0$.

1061. THE APPLICATION OF INFORMATION THEORY TO HUMAN OPERATOR PROBLEMS. PROCEEDINGS OF A SPECIAL TECHNICAL MEETING HELD AT THE ROYAL EMPIRE SOCIETY, 19TH SEPTEMBER 1955
Draper, J., Editor
1955

Directorate of Weapons Research, Dept. of Defense, Great Britain
Report WR(D) 2/56
ASTIA AD-98,382

This report contains: The Information-Capacity of the Human Operator in Symbolic and Non-symbolic Control Processes, by Crossman, E. R. F. W.; Application of Communication Theory to the Human Operator, by North, J. D.; On the Validity of Application of Communication Theory to Human Operator Problems, by Cherry, C.; Information Theory in Psychology, by Holding, D. H.; and Some Miscellanea on Information Theory and the Human Operator, by Hick, W. E.

1062. INFORMATION THEORY AND OPTICAL IMAGES

Linfoot, E. H.
***Journal of the Optical Society of America*, v. 45, pp. 808–819, 1955**

An account of analytical techniques which provide a basis for a discussion of the problem of maximizing the information content in images formed by high-quality optical systems, by means of aberration balancing under prescribed constraints on the design. A derivation is given of the principal results needed for this purpose. (*PsyA*, 1956, #6739)

1063. CAPACITY OF AN OPTICAL CHANNEL IN THE PRESENCE OF NOISE

di Francia, G. T.
***Optica Acta*, v. 1, pp. 5–8, 1955**

An optical instrument can be considered as a transmission channel. The capacity of the channel is evaluated by applying standard results of information theory. The instrument is assumed to be free from aberrations, and color is not considered. It is concluded that all necessary elements are now at hand for investigation of the redundancy of an optical system when employed to observe objects of given optical statistics. (*PsyA*, 1956, #8030)

1064. AN EXAMINATION OF INFORMATION THEORY

Bar-Hillel, Y.
***Philosophy of Science*, v. 22, pp. 86–105, 1955**

"The full communication process . . . can be split up, for specialized study, in various ways." Since "information" may mean either a signal sequence or what is expressed by a signal sequence, the term "information theory" is ambiguous and should be replaced by "theory of signal transmission" and "theory of semantical content." These two theories are "formally analogous" and have a calculus in common. (*PsyA*, 1956, #939)

1065. MAXIMUM INFORMATION RATE THROUGH A HUMAN CHANNEL IN READING

Pierce, J. R. and Karlin, J. E.
***Science*, v. 122, p. 879, 1955**

1066. PROBLEMS IN HUMAN COMMUNICATION AND CONTROL

Licklider, J. C. R., Editor
Massachusetts Institute of Technology, Cambridge, 1955

This is a largely paraphrased transcription of a Conference on Problems in Human Communication and Control . . . sponsored by the National Science Foundation at M.I.T. June 15–17, 1954. Verbatim or paraphrased discussion was based upon a tape recording. The subjects discussed at several sessions included channel capacity of the human operator, context, multivariate information transmission, signal analysis and detection, stochastic structure, concept formation, and self-organizing automata. (*PsyA*, 1956, #5941)

1067. CYBERNETICS: CIRCULAR CAUSAL AND FEEDBACK MECHANISMS IN BIOLOGICAL AND SOCIAL SYSTEMS. TRANSACTIONS OF THE TENTH CONFERENCE, APRIL 22, 23, AND 24, 1953, PRINCETON, N. J.

von Foerster, H., Editor
Josiah Macy, Jr., Foundation, New York, 1955

Topics discussed at the final conference on cybernetics were: Introductory Remarks, by McCulloch, W. S.; Studies on Activity of the Brain, by Grey-Walter. W.; Semantic Information and Its Measures, by Bar-Hillel, Y.; Meaning in Language and How It Is Acquired, by Chao, Y. R.; and Appendix I: Summary of the Points of Agreement Reached in the Previous Nine Conferences on Cybernetics, by McCulloch, W. S. 35 references. (*PsyA*, 1956, #5428)

1068. MATCHING OF OPERATIONAL LANGUAGES IN DOCUMENTARY SYSTEMS
Fairthorne, R. A.
February 1956
North Atlantic Treaty Organization, Advisory Group for Aeronautical Research and Development, Paris, France
AGARD-R-49

An "alphabet" of operations or of marks is called a "script." Scripts can be represented algebraically and partially ordered by inclusion. Script inclusion involves explicitly the available clerical facilities for pattern recognition, discrimination, and storage.

1069. EFFECTS OF REDUNDANT INFORMATION ON SPEED OF INFORMATION-PROCESSING BY HUMAN BEINGS
Turner, S. H., Wallace, W. H., and Wessel, A. E.
April 30, 1956
University of Pennsylvania, Institute for Cooperative Research, Philadelphia
Report WE-56-U-M-1
DA 36-039-sc-63143,
ASTIA AD-143,848

The effect of a specific type of redundant information on the performance of human beings while performing information-processing tests is described. A redundant message is defined as an alternate input message which can be used to obtain the desired output message as efficiently as some other given input message. Forty-eight enlisted men of above average intelligence were given three basic tasks; each task was repeated four times in a different form. Performance was measured by: (1) the amount of time required for completion, (2) the number of successful and unsuccessful completions, and (3) the use of efficient or nonefficient solution methods. Redundancy had no significant effect upon the correctness of task performance. Redundancy decreased the speed of task performance and the usage of efficient procedure and increased the usage of inefficient procedures.

1070. ON THE RATE WITH WHICH INFORMATION IS COMMUNICATED
Davis, H.
May 1956
University of California, Los Angeles
Report 56-20, N6onr-27516
ASTIA AD-99,751

For over a century it has been known that there are limitations to the rate with which information bearing electric signals can be transmitted. In 1948, Claude Shannon first presented a systematic approach to the problem of determining the inherent limitation on the rate with which information can be communicated. This report begins with a re-examination of the foundations of Shannon's approach, somewhat broadening the mathematical basis of the definitions, and connecting these definitions in a more direct way to familiar concepts. These new definitions are applied, and in certain special cases (stationary Gaussian stochastic processes), rigorous calculations are performed to determine the rate with which the information is communicated. Applications, and the engineering significance of these, and related results, are discussed.

1071. THEORY OF INFORMATION FEEDBACK SYSTEMS
Chang, S. S. L.
June 15–September 15, 1956
New York University, College of Engineering, N. Y.
Scientific Report 3, AFCRC-TN-56-584,
AF 19(604)1049
ASTIA AD-08,787

1072. THE PLACE OF "MEANING" IN THE THEORY OF INFORMATION
MacKay, D. M.
Proceedings of the Third Symposium on Information Theory, Royal Institution, London, September 12–16, 1955
In "Information Theory," Cherry, C., Editor
Academic Press, New York, N. Y., 1956,
pp. 215–225

The meaning of a message is defined as the "selective function" of the message on a specific ensemble of possible courses of action. Meaning is thus equated to selective information and is measured in terms of the magnitude of change brought about by its selective operation upon the particular ensemble. (*PsyA*, 1957, #4614)

1073. STUDIES OF HUMAN CHANNEL CAPACITY
Quastler, H.
Proceedings of the Third Symposium on Information Theory, Royal Institution, London, September 12–16, 1955
In "Information Theory," Cherry, C., Editor
Academic Press, New York, N. Y., 1956, pp. 361–371

The empirical limit of human operator information transmission is estimated at 50 bits/second. Some of the factors limiting human information transmission are enumerated. (*PsyA*, 1957, #4623)

1074. SOME CONSEQUENCES OF THE FINITENESS OF INFORMATION
van Soest, J. L.
Proceedings of the Third Symposium on Information Theory, Royal Institution, London, September 12–16, 1955
In "Information Theory," Cherry, C., Editor
Academic Press, New York, N. Y., 1956, pp. 3–7

The uncertainty principle places a lower limit on the precision of measurement that can be attained. While this principle need not obviate the information measurement of discrete communication channels, the author feels that serious difficulties are faced with the information measurement of continuous channels. (*PsyA*, 1957, #4634)

1075. THE MAGICAL NUMBER SEVEN, PLUS OR MINUS TWO: SOME LIMITS ON OUR CAPACITY FOR PROCESSING INFORMATION
Miller, G. A.
***Psychological Review*, v. 63, pp. 81–97, 1956**

A variety of researches are examined from the standpoint of information theory. It is shown that the unaided observer is severely limited in terms of the amount of information he can receive, process, and remember. However, it is shown that by the use of various techniques, e.g., use of several stimulus dimensions, recoding, and various mnemonic devices, this informational bottleneck can be broken. (*PsyA*, 1957, #2914)

1076. THE ESTIMATION OF TRANSMITTED INFORMATION WHEN CONDITIONAL PROBABILITIES ARE INTERDEPENDENT
Attneave, F.
In "Information Theory in Psychology: Problems and Methods," Quastler, H., Editor
The Free Press, Glencoe, Ill., 1956, pp. 118–123

An approximation procedure for the unbiased calculation of transmitted information is presented when the number of judgments per degree of freedom is low and when the assumption of independence is clearly not in evidence. The approximation procedure requires pooling of responses in terms of the "correctness of the response." Since informational statistics are nominal rather than ordinal, additional assumptions must be made. (*PsyA*, 1957, #2867)

1077. SCIENCE AND INFORMATION THEORY
Brillouin, L.
Academic Press, New York, N. Y., 1956

Modern information theory is mathematical and practical. When defined as I (bits) $= \log_2 P$, where P represents the number of equally likely possible outcomes in a situation, information does not have connations for value or importance. Four properties of the definition are discussed in detail. Then there are treated in turn, coding and channel capacity, relation of the theory to classical thermodynamics, Brownian and other random motion. It is shown that information, regarded as an organizing principle, is negentropy. Applications are given for the science of observation, for telecommunication, writing, reading, printing, and computing. (*PsyA*, 1957, #945)

1078. INFORMATION THEORY; PAPERS READ AT A SYMPOSIUM ON INFORMATION THEORY HELD AT THE ROYAL INSTITUTION, LONDON, SEPTEMBER 12–16, 1955
Cherry, C., Editor
Academic Press, Inc., New York, N. Y., 1956

Thirty-six papers are included in this book, along with the discussion that followed the papers. The topics include: philosophical fundamentals, coding for electronic systems, mechanical translation, human information processing, and neurophysiology. (*PsyA*, 1957, #4586)

1079. INFORMATION THEORY IN PSYCHOLOGY: PROBLEMS AND METHODS
Quastler, H., Editor
The Free Press, Glencoe, Ill., 1956

This volume presents papers presented before the Conference on the Estimation of Information Flow, Monticello, Illinois, July 5–9, 1954 and related papers. (*PsyA*, 1957, #2922)

1080. LA THEORIE DE L'INFORMATION
Lehmann, G.
***Societe des Ingenieurs Civils de France, Memoires*, v. 110, no. 3, pp. 159–173, May–June 1957**

Information theory; study of role of information in telecommunications and its importance in experimental sciences; relation between information and energy; principle of L. Brillouin tying information to entropy and second law of thermodynamics; role of information theory in physiology are covered. (*EI*, 1957)

1081. BIBLIOGRAPHY OF INFORMATION THEORY–(SECOND SUPPLEMENT)
Louis, F. and Stumpers, H. M.
***IRE Transaction on Information Theory*, v. IT-3, no. 2, pp. 150–166, June 1957**

About 1000 references classed under: general theory; bandwidth and transmission capacity, time-frequency uncertainty, signal-noise ratio; relation with statistical mechanics; correlation prediction, filtering, storage; radar and radio-navigation; speech, hearing, vision, linguistics; other biological applications; television; games, optics, servomechanisms; mathematics, statistics; pulse modulation, etc. are included (*EI*, 1957)

1082. OPTICAL DISPLAY FOR DATA-HANDLING SYSTEM OUTPUT
Ogle, J.
Paper Presented at the 7th Annual Eastern Joint Computer Conference, Washington, D. C., December 9–13, 1957, pp. 230–232
Institute of Radio Engineers, New York, N. Y.

1083. READING RATES AND INFORMATION RATE OF HUMAN CHANNEL
Pierce, J. R. and Karlin, J. E.
***IRE Convention Record*, v. 1, Part 2, Information Theory, p. 60, 1957**

1084. ON HUMAN COMMUNICATION; A REVIEW, A SURVEY, AND A CRITICISM
Cherry, C.
John Wiley & Sons, Inc., New York, N. Y., 1957
(Also The Technology Press, Massachusetts Institute of Technology, Cambridge, Mass., 1957)

A survey of various approaches to the study of human communication. Discussion of topics such as: difficulties in defining communication, the history of communication science, codes, the mathematical theory of communication, linguistics, the phoneme, the logical description of language; statistical studies of language, semantics, the physical analysis of signals, the vocal organs, the acoustic specification of speech, syntactic, semantic, and pragmatic information; cognition, pattern recognition, the brain as a machine. An appendix contains a glossary of terms; a 367-item bibliography. (*PsyA*, 1957, #2874)

1085. A COMPARATIVE ANALYSIS OF A THEORY OF ORGANIZATIONAL STRUCTURE AS PROPOSED BY LELAND B. KUHRE
Knebel, H. E.
June 1958
University of Wyoming, Natural Resources Research Institute, Laramie
Thesis
ASTIA AD-160,515

The theory of atorgenics was reviewed and compared with the concepts, views, and methodologies of various authorities and scholars in the field of organization. The theory differs from others in the following areas: (1) idea flow as a principle of organization; (2) the methodology of designing the organizational structure; and (3) the team pattern of organization. The discussion was concerned with the body of principles and laws that strengthen organizational structure as well as using that structure effectively in achieving its purpose.

1086. STATE-LOGIC RELATIONS IN AUTONOMOUS SEQUENTIAL NETWORKS
Kautz, W. H.
Paper Presented at the 8th Annual Eastern Joint Computer Conference, Philadelphia, Pa., December 3–5, 1958
Institute of Radio Engineers, New York, N. Y.

1087. SYSTEM EVALUATION AND INSTRUMENTATION OF A SPECIAL PURPOSE DATA PROCESSING SYSTEM USING SIMULATION EQUIPMENT
Strassman, A. J. and Kurkjian, L. H.
Paper Presented at the 8th Annual Eastern Joint Computer Conference, Philadelphia, Pa., December 3–5, 1958
Institute of Radio Engineers, New York, N. Y.

1088. A DESCRIPTIVE THEORY OF COMMUNICATION
Maclay, H.
1958
University of New Mexico, Albuquerque
Report, AFOSR-TN-58-1112, AF 40(638)33
ASTIA AD-207,835

1089. OPTIMUM INFORMATION-ACQUISITION SYSTEMS
Harris, B., Hauptschein, A., and Schwartz, L. S.
Operations Research, v. 6, pp. 516–529, July–August, 1958

This paper suggests and describes a criterion for rating communication systems which takes into account both the risk cost of a decision and the corresponding communication cost, both of which depend on the magnitude of the parameter's power, bandwidth, and time. Optimum operating conditions (i.e., reliability) for three kinds of binary communication systems (unidirectional, bidirectional employing information feedback, bidirectional employing decision feedback) are determined.

1090. SYMBOLIC LOGIC AND AUTOMATIC COMPUTERS
Berkeley, E. C.
Computers and Automation,
Part 1, v. 7, no. 11, pp. 18–20, November 1958;
Part 2, v. 7, no. 12, pp. 28–29, December 1958;
Part 3, v. 8, no. 1, pp. 18–22, January 1959

1091. ANALYSIS OF A CERTAIN SCHEME FOR THE RECEPTION OF BINARY SIGNALS
Meshkovskii, K. A.
Elektrosvyaz, no. 12, pp. 3–9, 1958

1092. SYMPOSIUM ON INFORMATION THEORY IN BIOLOGY
Frishkopf, L. S. and Rosenblith, W. A.
Pergamon Press, New York, N. Y., 1958

1093. APPLICATION OF ERROR-CORRECTING CODES TO MULTI-WAY SWITCHING
Takahasi, H. and Goto, E.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 396–400

1094. THE PRINCIPLE OF MAJORITY DECISION LOGICAL ELEMENTS AND THE COMPLEXITY OF THEIR CIRCUITS
Muroga, S.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 400–407

1095. A THREE-VALUED SYSTEM OF LOGIC AND ITS APPLICATION TO BASE THREE DIGITAL CIRCUITS
Vacca, R.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 407–414

1096. THE POSSIBILITY OF SPEEDING UP COMPUTERS USING PARAMETRONS
Billing, H. E. and Rüdiger, A. O.
Proceedings of the International Conference on Information Processing, UNESCO, Paris, June 15–20, 1959, pp. 461–466

1097. AN INFORMATION TRANSLATING SYSTEM
DePhillipo, W. J. and Chien, K. Li
September 1, 1959
RCA, Camden, N. J.
Patent 2,902,679; Washington, D. C.

1098. A UNIVERSAL COMPUTER CAPABLE OF EXECUTING AN ARBITRARY NUMBER OF SUB-PROGRAMS SIMULTANEOUSLY
Holland, J.
Paper Presented at the Eastern Joint Computer Conference, Boston, Mass., December 1–3, 1959
Institute of Radio Engineers, New York, N. Y.

1099. THE NEXT GENERATION OF COMPUTERS
Boehm, G. A. W.
Fortune, v. 59, pp. 132–135, March 1959

1100. MATHEMATICAL PROGRAMMING AND ELECTRICAL NETWORKS
Dennis, J. B.
John Wiley & Sons, Inc., New York, N. Y., 1959
(Also The Technology Press, Massachusetts Institute of Technology, New York, N. Y., 1959)

1101. INFORMATION PROCESSING
March 15, 1960
Massachusetts Institute of Technology, Lincoln Lab., Lexington
QPR-Division 5
AFCRC-TN-60-1006, AF 19(604)-5200

Further research and development relative to digital computers, data processing, computer components, analysis and psychology are presented.

1102. ON THE PROBLEM OF MINIMAL DESCRIPTION
Blokh, E. L.
Radiotekhnika, v. 15, no. 2, pp. 10–14, 1960

MAN–COMPUTER SYMBIOSIS

1103. CHARACTERISTICS OF THE HUMAN OPERATOR AS AN ELEMENT IN A CLOSED-LOOP CONTROL SYSTEM
Hayes, K. A.
May 1953
Directorate of Weapons Research, Dept. of Defence, Great Britain
Report WR(D)9/53
ASTIA AD-14,664

1104. INFORMATION THEORY AND MAN–MACHINE SYSTEMS
Operations Research, v. 2, pp. 320–328, August 1954
(See also ASTIA AD-50-961)

1105. THE INFORMATION CAPACITY OF THE HUMAN MOTOR SYSTEM IN CONTROLLING THE AMPLITUDE OF MOVEMENT
Fitts, P. M.
September 1954
Ohio State University Research Foundation, Columbus
Report, AFPT RC-TR-54-41, AF 33(038)10528
ASTIA AD-49,235
(See also *Journal of Experimental Psychology*, v. 47, pp. 381–391, June 1954)

1106. MAN AS A LINK IN COMPLEX MACHINE SYSTEMS
Scientific Monthly, v. 83, pp. 269–276, December 1956
(See also ASTIA AD-140,904)

1107. MEASUREMENT OF PILOT MENTAL EFFORT
Cohen, S. I. and Silverman, A. J.
May 1957
Advisory Group for Aeronautical Research and Development, Paris, France
AGARD Report 148
ASTIA AD-200,672

This paper, presented at the tenth meeting of the Flight Test Techniques Panel, May 20–24, 1957, London, discusses the factors which affect a pilot's ability to respond to situations demanding effort and methods of measuring his total psycho-physiologic response. A description is given of some methods and quantitative results obtained in research at the Aero-Medical Laboratory of the Wright-Patterson Air Force Base.

1108. OPERATIONAL ASPECTS OF SOME FUNDAMENTAL CONCEPTS OF HUMAN COMMUNICATION
MacKay, D. M.
1958
University of London, King's College, Wheatstone Physics Lab., England
Reprint

The concept of information and the complementary concepts of information-content are discussed. The adaptive response of the human receiver is considered in detail.

1109. MATCHING THE MAN SYSTEM AND THE ELECTRONICS SYSTEM IN DESIGN AND OPERATIONS
Proceedings of the National Aeronautical Electronics Conference, May 4–6, 1959, pp. 44–48
Institute of Radio Engineers, New York, N. Y

1110. INFORMATION PROCESSING QUARTERLY PROGRESS REPORT
June 15, 1959
Massachusetts Institute of Technology, Lincoln Lab., Lexington
Division 5-QPR, AFCR-TN-59-1009, AF 19(604)-5200

The TX-2 computer, a high-speed, large-memory, flexible machine with unique input-output features has begun to see some experimental use. A magnetic thin-film memory has been operating successfully in the Laboratory and will be tested further as a functional element of TX-2. The psychology of man-machine communication is also discussed.

1111. THE HUMAN OPERATOR AS A SERVO SYSTEM ELEMENT
McRuer, D. T. and Krendel, E. S.
***Journal of the Franklin Institute*, v. 267, no. 5, pp. 381–403, May 1959**

USAF-supported presentation of the analytic basis for human dynamics measurements, including a mathematical model for the human operator, composed of a describing function and "remnant." Steady-state describing functions measured by various experiments are discussed, and the adaptive, optimizing behavior of the human operator is demonstrated. The remnants are also discussed and plausible sources for their origin are postulated. (*A/SE*, August 1959)

1112. MAN–COMPUTER SYMBIOSIS
Licklider, J. C. R.
***IRE Transactions on Human Factors in Electronics*, v. HFE, pp. 4–10, March 1960**

Man–computer symbiosis is an expected development in cooperative interaction between men and electronic computers. It will involve very close coupling between the human and the electronic members of the partnership. The main aims are: (1) to let computers facilitate formulative thinking as they now facilitate the solution of formulated problems, and (2) to enable men and computers to cooperate in making decisions and controlling complex situations without inflexible dependence on predetermined programs. In the anticipated symbiotic partnership, men will set the goals, formulate the hypotheses, determine the criteria, and perform the evaluations. Computing machines will do the routinizable work that must be done to prepare the way for insights and decisions in technical and scientific thinking. Preliminary analyses indicate that the symbiotic partnership will perform intellectual operations much more effectively than man alone can perform them. Prerequisites for the achievement of the effective, cooperative association include developments in computer time sharing, in memory components, in memory organization, in programming languages, and in input and output equipment.

1113. A BIO-ELECTRIC SYSTEM OF EQUALIZATION
Breido, M. G., Gurfinkel, V. S., Kobrinskii, A. E., Sysin, A. Ya., Tsetlin, M. L., and Yakobson, Ya. S.
***Problems of Cybernetics*, Vol. II (in press, 1960)**

AUTHOR INDEX

Author	Entry
Abelson, R. P.	777
Adams, E. W.	982
Adams, P. A.	826
Adey, W. R.	353
Adrian, E. D.	250
	251
	252
	300
	382
Ahmavaara, Y.	245
Aiken, E. G.	764
Airapetiants, E. Sh.	381
Aizerman, M. A.	224
Akushsky, Yu. I. Y.	215
Alekseev, M. A.	206
Allan, M. D.	639
Allanson, J. T.	270
Allport, F. H.	587
Amassian, V. E.	310
	421
Ames, A., Jr.	651
Anderson, N. H.	820
	844
Anderson, S. B.	954
	957
	1,005
Andrews, T. G.	638
Angell, J. R.	41
Applezweig, M. H.	755
	801
Aprison, M. H.	415
Archer, E. J.	953
Arend, R.	52
Armington, J. C.	302
	305
	306
Arnoult, M. D.	603
Arntzen, F.	84
Arrow, K. J.	1,017
Ashby, W. R.	63
	150
	890
Asratian, E. A.	283
Atkinson, R. C.	811
	871
	875
Attneave, F.	557
	603
	893
	1,076
Attura, G. M.	355
Audley, R. J.	816
	850
	870
Austin, G.	151
Ayres, A. J.	660
Bachrach, A. J.	144
Bagby, J. W., Jr.	569
Bahrick, H. P.	960
	994
	1,028
Bailey, G. E. C.	445
Bakan, D.	759
Bakan, P.	588
Baker, F.	289
Baker, K. E.	595
Balasheck, S.	469
Ball, R. S.	143
Banghart, F. W.	144
Bargh, P. F.	454
Bar-Hillel, Y.	1,064
	1,067
Barker, D. B.	712
Barlow, J. S.	315
	357
	360
	361
Barratt, P. E. H.	239
Barrett, T. H., Jr.	887
Bartlett, F.	207
Bartley, S. H.	661
	687
Basescu, S.	766
Basilevsky, Y.	215
Basore, B. L.	876
Bassett, J. D.	484
Battersby, W. S.	286
Baudry, F. D.	801
Baxter, C. E.	598
Bay, E.	84
Beardslee, D. C.	688
Beck, W.	84
Becker, F.	84
Becker, H.	85
Behan, R. A.	76
Bélénesku, I. N.	7
Bellman, R.	715
	915
Bello, F.	119
Bellville, J. W.	355
Belskaya, I. K.	518
Bemer, R. W.	1,043
Bengston, R. J.	717
Bergstrom, R. M.	626
Berkeley, E. C.	1,090
Berman, A.	275
Bernreuter, R. G.	229
Bernstein, A.	923
	927
Beshers, J. M.	162
Beurle, R. L.	264
Bevan, W.	857
Billing, H. E.	1,096
Bills, A. G.	729
Binder, A.	579
Bindra, D.	116
Bingham, W. E., Jr.	314
Birnbaum, A.	243
Bishop, G. A.	316
Bitterman, M. E.	756
Blackwell, H. R.	693
	709
Blanc, C.	400
Blanshard, B.	47
Blasbalg, H.	561
Blatt, S. J.	359
Blatz, W. E.	296
Bledsoe, W. W.	499
Blokh, E. L.	1,102
Boehm, G. A. W.	1,099
Boesch, E.	85
Bolles, R. C.	856
Bomba, J. S.	500
Booth, A. D.	519
	1,049
Boren, J. J.	837
Bornemann, E.	84
	85
Boswell, R. S.	340
Bourne, L. E., Jr.	600
	953
	1,029
Brady, J. V.	858
Brain, W. R.	602
Braine, M. D. S.	220
Braines, S. N.	36
Brandt, G.	698
Brazier, M. A. B.	345
	360
	363
	428
Breido, M. G.	1,113
Bremer, F.	382
	417
Bremermann, H. J.	190
Brengelmann, J. C.	84
	85
Bresson, F.	102
Brillouin, L.	1,077
Brindley, G. S.	341
Brinkmann, D.	84
Broadbent, D. E.	562
	888
	891
	900
Brody, A. L.	841
Broido, D.	465
Bronk, D. W.	250
Bronson, W. C.	540
Brooks, F. C.	484
Brown, F. G.	953
Brown, R. M.	315
	361
Brown, R. W.	151
Brown, W. L.	178
Browning, I.	499
Bruner, J. S.	151
	623
	629
	686
Brunswik, E.	565
	623
Bugelski, B. R.	833
Bullock, T. H.	284
	291
Burian, H. M.	312
Burke, C. J.	796
	848
Burks, A. W.	136
	159
Burn, J. H.	387
Burns, B. D.	208
	377
	907
Burt, C.	230
Bush, R. R.	807
	965
Buslenko, N. P.	134
Buswell, G. T.	990
Cahill, H. E.	909
Cahn, L.	461
Cajal, P. R.	364
Calvin, A. D.	104
	955
Campbell, D. T.	611
Campos, N.	528
Carr, J. W., III	31
Carterette, E. C.	695
Cartwright, G. P.	1,041
Caruso, I. A.	574
Castilla del Pino, C.	583
Champion, R. A.	93
Chandessais, Ch.	179
Chang, S. S. L.	1,071
Chao, Y. R.	1,067
Chapanis, A.	999
Chauchard, P.	422
Cherry, C.	266
	270
	612
	1,061
	1,072
	1,073
	1,074
	1,078
	1,084

Author	Entry
Chien, K. Li	1,097
Chisholm, R. M.	652
Chistovich, L. A.	630
Chlenov, L. G.	396
Chodorkoff, B.	677
Chodorkoff, J.	677
Chow, C. K.	451
Chow, K. L.	308
Christal, R. E.	905
Christensen, P. R.	233
	237
	240
	988
Christian, P.	233
	237
	240
	988
Chukichev, I. P.	80
Church, R. M.	842
Clancy, J. J.	104
Clark, S. L.	371
Clark, W. A.	260
	295
	327
	436
Clark, W. C.	693
Cleave, J. P.	512
Clifford, L. T.	104
Coburn, H. E.	62
	75
Cofer, C. N.	744
	812
Cohen, M.	398
Cohen, S. I.	1,107
Cole, M.	695
Collier, G.	556
Compton, A. H.	186
Conklin, J. E.	680
	708
Coombs, C. H.	113
	656
	781
	853
	959
	965
Coonan, T. J.	744
Cossa, P.	130
Costa, A. M.	597
Costa, E.	415
Crane, H. D.	293
Crescitelli, F.	262
Crider, D. B.	171
Cronbach, L. J.	109
	110
	118
	234
	591
Crook, M. N.	689
Crossman, E. R. F. W.	1,061
Culbertson, J. T.	29
	54
Cullen, C.	323
Cullen, J. W.	794
Curran, J. J.	640
Curtis, D. L.	934
Dale, P. W.	121
	174
Dalkey, N. C.	947
Daniel, R. S.	301
Danishevsky, D. S.	11
Das, J. P.	773
Däumling, A.	84
	85
David, E. E., Jr.	675
Davidson, D.	962
Davies, D. W.	221
Davies, P.	275
Davis, H.	1,070
Davis, J. F.	948
Davis, L. W.	876
Davis, M.	928
Davis, R.	650
Davis, R. L.	781
	959
Day, R. H.	606
	644
de Broglie, L.	1,050
Deese, J.	743
	872
de Groot, A. D.	105
Deininger, R. L.	991
DeKleine, E. H.	679
De Latil, P.	30
	81
Delgado, J. M. R.	311
DeLong, A. R.	236
Delpech, L.	172
DeMeter, E. R.	443
Denes, P.	493
Dennis, J. B.	1,100
de Nó, R. L.	299
DePhillipo, W. J.	1,097
Deutsch, J. A.	568
	666
	817
Deutscher, C.	791
diFrancia, G. T.	1,063
Dimond, T. L.	462
Dodwell, P. C.	667
Doerr, E.	33
Dolch, J.	84
Dolgo-Saburov, B. A.	261
Draguns, J.	648
Draper, J.	1,059
	1,060
Drey-Fuchs, C.	84
Drobits, R.	671
DuBois, P. H.	853
Ducasse, C. J.	44
Duda, W. L.	268
Dudley, H.	469
Düker, H.	84
Dulany, D. E., Jr.	788
Duncan, F. G.	513
Dunham, B.	840
	933
Dunlap, J. W.	965
Dvorine, I.	672
	673
Dwiggins, R. D.	618
Eccles, J. C.	256
	258
	278
Edmunds, D.	21
Edwards, C.	257
Edwards, W.	966
	975
	965
Egan, J. P.	902
Eichmeier, J.	349
Ellingson, R. J.	324
Ellson, D. G.	43
Ercoles, A. M.	659
Ericksen, S. C.	879
	880
Eriksen, C. W.	563
	607
	952
	958
	976
Esten, R. D.	447
Estes, W. K.	165
	779
	796
	804
	815
	848
	965
Evey, R. J.	501
Ewert, O.	85
Eysenck, H. J.	851
Fagot, R. F.	982
	995
Fain, V. S.	497
Fairthorne, R. A.	1,068
Faltheim, A.	834
	983
Fantz, R. L.	681
Farber, I. E.	741
	742
Farley, B. G.	260
	295
	327
	436
	886
Farquharson, R.	916
Feldman, H.	595
Ferren, J.	186
Festinger, L.	623
Feudell, P.	901
Fiorentini, A.	659
Firnau, H. J.	84
Fischer, G. H.	84
Fitch, F. B.	43
	48
Fitts, P. M.	548
	616
	960
	991
	1,105
FitzHugh, R.	637
Flavell, J. H.	648
Flood, M. M.	965
Flores, C.	897
	903
Fogel, L. J.	6
Fonzi, A.	665
Ford, A.	326
Forgie, C. D.	487
Forgie, J. W.	468
	487
Fraisse, P.	567
	897
Framo, J. L.	100
Frankel, S.	125
	482
Freeman, G. L.	372
Freedman, J.	704
French, R. S.	740
Freund, J. E.	978
Freygang, W. H., Jr.	287
Fridshal, R.	933
Friedberg, R. M.	716
Frishkopf, L. S.	327
	1,092
Frost, L.	394
Fuchs, R.	84
	85
Gagne, R. M.	856
Gaito, J.	201
Galanter, E.	149
	1,027
Ganzhorn, K.	479
Garattini, S.	208
Gardner, W. L.	712
Garner, W. R.	607
Gates, A. I.	572
Gatti, J.	549
Gaydos, H. F.	570
Geldard, F. A.	615
Gelernter, H. L.	926
	932
Gellhorn, E.	531
Gemelli, A.	664
Gengerelli, J. A.	794
	866

Author	Entry
George, F. H.	15
	74
	120
	192
	282
	643
Gerstenhaber, M.	149
Gerstman, L. J.	430
Geyer, B. H.	713
Ghetti, V.	208
Gibbs, C. B.	86
	753
Gibson, E. J.	536
	542
	578
	581
Gibson, J. J.	526
	533
	578
	581
	760
Gilen, L.	85
Gilinsky, A. S.	566
Gilmore, H. F.	464
Gilmore, J. T.	327
Ginsberg, A.	97
Giuliano, V. E.	515
Glantz, H. T.	448
Glanzer, M.	1,038
Glaser, G. H.	389
Glauberman, M. H.	442
Gloor, P.	393
Glovazky, A.	441
Gogel, W. C.	692
Gold, B.	476
Goldman, S.	189
Goldstein, M. H., Jr.	358
	361
	362
	426
Gomes Penna, A.	56
	737
	787
Good, I. J.	14
	945
Goodman, R.	1,049
Goodnow, J. J.	151
	970
	998
Goodson, J. E.	852
Gotlieb, C. C.	12
Goto, E.	1,093
Gottschaldt, K.	84
Gottschick, J.	276
Gottsdanker, R. M.	302
	303
	305
	306
Graefe, O.	84
	85
Graham, C. H.	65
	622
	683
Granit, R.	386
	416
	590
Grant, D. A.	89
	844
Gray, F. E.	302
	305
	306
Greanias, E. C.	446
	449
	455
Green, A.	219
Green, B. L., Jr.	40
	705
Green, D. M.	706
Green, E. J.	797
	1,033
Green, J.	333
Green, L. E. S.	12
Grey-Walter, W.	1,067
Grimsdale, R. L.	494
	720
Gropper, G. L.	540
Gruhle, H. W.	84
Gubko, A. T.	203
Guilbaud, G. T.	107
Guilford, J. P.	227
	233
	237
	240
	241
	242
	988
Guillaume, P.	103
Gulick, W. L.	636
Gulliksen, H.	225
Gurevich, B. Kh.	277
Gurfinkel, V. S.	272
	1,113
Gusev, L. A.	224
Gutenmakher, L. I.	158
Guttman, I.	853
Guttman, N.	675
Gyr, J. W.	1,045
Haber, S. L.	575
Hagensick, P. W.	940
Hagopian, R. H.	466
Haibt, L. H.	268
Hake, H. W.	563
	624
Haldane, J. B. S.	765
Hall, A. C.	980
Hall, J. L., II.	699
Halle, M.	480
Hamilton, C. E.	690
Hamlyn, D.	632
Hammer, M.	767
	795
Handlon, J. H.	120
	643
Hanes, J. W.	186
Harlow, H. F.	418
	734
	846
	1,048
Harlow, M. K.	1,048
Harper, K. E.	931
Harris, B.	1,004
	1,006
	1,034
	1,089
Harris, J. N.	483
Harris, K. S.	551
Hartline, H. K.	701
Hartnacke, W.	84
Harvey, G. G.	223
Hauptschein, A.	1,004
	1,006
	1,089
Hawkins, E. N.	513
Hay, J. C.	509
Hayes, K. A.	1,103
Hays, D. G.	931
Hearnshaw, L. S.	94
Heasly, C. C., Jr.	454
	491
Heath, R. G.	318
Hebb, D. O.	53
	70
	123
	209
Heider, F.	623
Heiss, R.	84
	85
Hellpach, W.	84
Henle, M.	987
Herrnstein, R. J.	837
	858
Herwig, B.	84
Hetzer, H.	84
Hick, W. E.	1,061
Hicks, L. H.	846
Highleyman, W. H.	492
Hilgard, E. R.	835
Hill, Y. M.	455
Hillebrand, M. J.	84
	85
Hiltmann, H.	84
	85
Hoban, C. F.	981
Hochberg, J. E.	575
	596
	620
Hodge, M. H.	657
	700
Höhn, E.	84
Hoke, H. W.	607
	952
	976
Holbrook, J. D.	769
Holding, D. H.	1,061
Holland, J.	268
	1,098
Homme, L. E.	824
Hopkins, C. O.	1,020
Hoppel, C.	446
	449
Householder, A. S.	49
Hovland, C. I.	728
	732
	733
	747
	909
	1,047
Howarth, E.	92
Hrbek, Jan	108
Hrbek, Jaromir	108
Hughes, G. W.	480
Hull, C. L.	43
	732
	733
Humphrey, G.	67
	971
Hunt, C. C.	269
Hunt, E. B.	728
	1,047
Hunt, W. A.	1,021
Hunter, I. M. L.	1,003
Hurvich, L. M.	647
Huth, A.	84
Iaroshevskii, M. G.	205
Iijima, T.	477
Imboden, J. B.	627
Imoto, K.	477
Inhelder, B.	115
	131
Irvine, R. P.	634
Irwin, F. W.	986
Jacobs, H. H.	965
Jacobsen, W.	84
Jacobson, E.	297
James, H.	906
Jameson, D.	647
Janiw, W.	84
	85
Jarvik, E.	965
Jarvis, K. W.	16
Jasper, H. H.	317
	320
	323
	382
	393
Jeeves, M. A.	823
	828
Jeffrey, R. C.	214
Jenkin, N.	641

Author	Entry
Jerison, H. J.	213
	964
Jessor, R.	202
John, E. R.	1,001
	1,008
Johnson, C. W.	713
Jonckheere, A. R.	816
Joseph, H. M.	439
Jouvet, M.	322
	336
	352
	877
Judge, J. F.	1,044
Kagan, J.	868
Kalaba, R.	715
Kallman, H. E.	34
Kamentsky, L. A.	490
	492
Kanfer, F. H.	610
Kao, R. C.	965
Karamian, A. I.	72
Karasik, A. D.	617
Karlin, J. E.	1,055
	1,083
Karwoski, T. F.	152
Katz, B.	285
Kaufman, A. E.	1,026
Kautz, W. H.	1,086
Kazmierczak, H.	481
Keats, J. A.	164
	232
Keenau, J.	743
Kelleher, R. T.	827
Keller, F. S.	780
Kemeny, J. G.	128
	849
Kendler, H. H.	617
	883
	950
	1,015
Kennedy, J. L.	302
	303
	305
	306
Kerschbaum, P.	85
Kesselman, M. L.	350
Kesselring, M.	85
Kettner, N. W.	233
	237
	240
	988
Kharkevich, A. A.	467
	495
	496
Kiang, N. Y. S.	358
	426
Kilburn, T.	494
	720
Kilpatrick, F. P.	573
	774
Kincaid, W. M.	690
	691
	709
King, G. W.	722
Kirchhoff, R.	85
Kirsch, R. A.	461
	502
	714
Kister, J.	920
Klass, P. J.	510
Kleene, S. C.	254
Klein, G. S.	73
Kliemke, E.	84
Klix, F.	586
Kloomok, M. K.	446
	449
Knebel, H. E.	1,085
Kobrinskii, A. E.	1,113
Koch, S.	779
Kochen, M.	28
	431
	440
	1,027
Kogan, A. B.	343
Kogan, N.	196
Kohler, I.	84
Kohler, W.	410
	522
	859
Konecci, E. G.	9
Konorski, J	374
Koshtoiants, Kh. S.	403
Kovasznay, L. S. G.	439
Kozhevnikov, V. A.	334
Krech, D.	604
Krechevsky, I.	731
Kreisel, H.	84
Krendel, E. S.	1,111
Krenek, E.	186
Krieg, W. J. S.	392
Kristofferson, A. B.	709
Kroh, O.	84
Krudewig, M.	85
Krulee, G. K.	676
Kubie, L. S.	946
Kuhlenbeck, H.	163
Küppers, K.	84
Kurkjian, L. H.	1,087
Kurtz, K. H.	798
Lachman, S. J.	830
Lamperti, J.	874
Langdon, J.	582
Landahl, H. D.	49
Landgren, S.	398
Lansing, R. W.	331
Lapshin, O. V.	204
Larrabee, M. G.	257
Lashley, K. S.	308
Lashley, K. S. (Cont'd)	365
	366
	367
	368
	369
	370
Lassek, A. M.	182
Lawrence, D. H.	861
Lazarus, R. S.	743
Leeper, R.	112
Le Gros Clark, W.	678
Lehman, R. A.	169
Lehmann, G.	1,080
Leibold, W.	84
Lennox, M. A.	407
	425
Leonard, A. J.	616
Leonard, J. A.	635
Lesse, H.	318
Lettvin, J. Y.	267
	427
Leuba, C.	800
Levine, M.	884
Lewis, D. J.	746
	757
Li, C. -L.	323
Liberman, E. A.	281
Liberson, W. T.	273
Licklider, J. C. R.	706
	1,066
	1,112
Lindsley, D. B.	298
	388
	404
	546
Lindzey, G.	559
Linfoot, E. H.	1,062
Linkovskii, G. B.	904
Linksz, A.	409
Linn, L.	376
Liudkovskaia, R. G.	274
Liverant, S.	248
Livshits, N. N.	342
Livson, N.	604
Lloyd, D. P.	304
Lomkovskaia, M. V.	520
Long, G. E.	3
Loper, J. S.	819
Lord, F. N.	853
Lortie, E. L.	474
Lossen, H.	84
Louis, F.	1,081
Loveless, N. E.	619
Lubin, A.	649
Luce, R. D.	965
	977
	1,009
Luckiesh, M.	523
Lunneborg, C. E., Jr.	698
Luthe, W.	84
Lyapunov, A. A.	1,049
McCandless, B. R.	231
McCarthy, J.	39
	153
	613
	924
MacCorquodale, K.	779
McCulloch, W. S.	16
	51
	57
	137
	160
	253
	267
	373
	427
	524
	1,051
	1,067
McGill, W. J.	114
	530
	1,055
McIntosh, B. B.	537
McIntyre, A. K.	304
McKellar, P.	183
MacKay, D. M.	61
	90
	138
	153
	1,072
	1,108
MacKay, R. P.	380
McKey, M. J.	706
Mackworth, J. F.	967
Mackworth, N. H.	967
	1,025
	1,025
Maclay, H.	1,088
McNaughton, R.	197
McNemar, O. W.	963
	969
McReynolds, P.	77
McRuer, D. T.	1,111
Macy, J., Jr.	550
Madle, E. J.	483
Magoun, H. W.	373
	375
	378
	423
Maier, N. R. F.	750
Malmo, R. B.	91
	288
	339
Maltzman, I.	881
	972
Mandler, G.	576
Mann, C. W.	527
Manning, W. H.	853
Margolis, M.	727
Marill, T.	592
Markowitz, H.	965

Author	Entry
Marron, J. E.	226
Marschak, J.	965
Martin, W. E.	776
Marx, M. H.	1,030
Mason, W. A.	1,048
Massnick, F.	38
Massucco Costa, A.	665
Mathers, B. L.	770
Mattson, R. L.	725
	882
Maturana, H. R.	427
Mayer, A.	85
Mayzner, M. S.	145
	146
	147
	148
	175
	176
	177
	199
Medvedev, Yu. A.	23
Meehl, P. E.	779
Meier, R. L.	26
Meili, R.	84
Meleshko, S. D.	420
Melton, A. W.	814
	984
Menger, K.	943
Menitskii, D. N.	166
Menkes, A.	845
Menkes, J.	845
Merchant, D. C.	472
Merwin, J. C.	118
Meshkovskii, K. A.	1,091
Metzger, W.	84
Meyer, D. R.	739
Meyer, G. L.	981
Meyerhoff, A. J.	935
Meyerson, I.	101
Michael, A. L.	599
Michael, M.	987
Michels, L. S.	937
Michotte van den Berck, A.	564
Mickle, W. A.	318
Mierke, K.	84
Miles, T. R.	246
Miller, G. A.	895
	899
	1,075
Miller, J. G.	45
	1,001
Miller, N. E.	311
Miller, W. H.	318
Milner, B.	393
Milner, P. M.	668
	847
Minsky, M. L.	21
	191
	502
Mitsos, S. B.	111
Mittenecker, E.	85
Mobell, G.	929
Moeller, G.	755
Mogendovich, M. R.	419
Molnar, C. E.	361
Monroe, R. R.	318
Mooers, C. N.	908
Moore, O. K.	746
	757
	954
	957
Morgan, K. C.	1,034
Morganstern, O.	944
Mori, G. F.	1,042
Morin, R. E.	799
Morrell, F.	320
Morrow, M. A.	789
Morrow, W. R.	168
Mosteller, F.	807
	865
Moulyn, A. C.	184
Mountcastle, V. B.	275
	412
Mowrer, O. H.	748
	751
	763
	764
	771
	775
	832
Mücher, H.	84
Muchow, B.	84
Muckler, F. A.	762
Mueller, C. G.	338
	779
Muenzinger, K. F.	96
	623
Mugglin, M. G.	27
Mujib, A.	772
Mukherjee, B. M.	822
Müller, W. H.	85
Mundy-Castle, A. C.	309
	332
Munsch, G.	84
Murdock, B. B., Jr.	825
Muroga, S.	1,094
Murphree, O. D.	313
Murphy, G.	831
Mushkina, N. A.	325
	413
Myers, R. E.	390
Nafe, J. P.	384
Napalkov, A. V.	36
Narikashvili, S. P	405
Naumova, T. S.	321
Needham, R. M.	514
Neisser, U.	498
	502
Nelson, H.	535
Netherwood, D. B.	32
Newell, A.	913
	917
	918
	919
	925
	930
	992
	1,018
	1,032
Newman, E. B.	430
	1,000
Nicholson, W. M.	790
Nolte, E.	85
Norrie, G. O.	445
Norris, S. F.	432
North, A. J.	823
	828
North, J. D.	1,061
Northrop, F. S. C.	186
Nygaard, J. E.	792
Nyman, A.	20
Oettinger, A. G.	137
	515
Ogle, J.	1,082
Okumura, Y.	477
Oléron, P.	228
	247
	1,024
Olsen, F.	186
	187
O'Neil, W. M.	685
Orbeli, L. A.	55
	265
Orne, M. T.	85
Orsini, F.	860
Osborne, J. S.	446
	449
Osburn, H. G.	649
Osgood, C. E.	623
Ostow, M.	127
Oswald, I.	337
Overall, J. E.	178
Papez, J. W.	414
Parker-Rhodes, A. F.	511
	514
Pastore, N.	609
Paton, W. D. M.	208
Pattishall, E. G.	144
Pavlov, B. V.	181
Payne, R. B.	761
Peake, W. T.	358
Pendleton, R. B.	1,029
Penfield, W.	381
Penrose, L. S.	37
Perkins, C. C., Jr.	803
Perotto, P. G.	218
Petrullo, L.	1,036
Phillips, L.	100
Piaget, J.	68
	71
	131
	140
	552
Pickenhain, L.	173
Pickett, J. M.	64
Pierce, J. R.	1,065
	1,083
Pinneo, L. R.	350
Pitts, W. H.	253
	267
	427
	524
Place, U. T.	139
Polanyi, M.	1,002
Pollack, I.	703
Pophal, R.	84
Poppe, C. W.	460
Porter, C. R.	880
Postman, L.	540
	541
	543
	805
	826
	970
Pradines, M.	555
Precker, J. A.	99
Prentice, W. C. H.	605
	662
Pribram, K. H.	397
Price, H. H.	82
Prichard, A. C.	996
Prosser, C. L.	379
Pubols, B. H., Jr.	863
Quastler, H.	161
	991
	1,053
	1,073
	1,076
	1,079
Rabe, A.	571
Raben, M. W.	658
Rabinovich, M. Ia.	319
	347
Radner, L.	64
Rahn, G.	84
Raiffa, H.	1,009
Rall, W.	263
	269
Rand, H. J.	186
Ranson, S. W.	371
Rapaport, D.	59
	623
Rapoport, A.	95
	122
	1,035

Author	Entry
Rashevsky, N.	129
Raskin, A.	554
Ratliff, F.	338
Rausch, E.	84
Ray, C.	461
Ray, L. C.	714
Ray, W. S.	638
	697
	1,019
	1,040
Razran, G.	577
Reed, H. B.	42
Reid, L. S.	657
Reifenberg, E.	198
Reiser, O.	210
Reiss, R. F.	294
Resag, K.	84
Restle, F.	802
	806
Revers, W. J.	84
	85
Révész, G.	547
Rhine, R. J.	961
Richardson, A. M.	670
Richardson, J.	892
Richter, D.	279
Richter, M. N., Jr.	169
	1,031
Riggs, L. A.	411
Ritchie, M. L.	762
Roback, A. A.	588
Roberts, M. de V.	927
Roberts, W. W.	311
Roby, T. B.	1,046
Rochester, N.	268
	926
Rock, I.	642
Roff, M.	761
Rohracher, H.	85
Rokeach, M.	142
Rome, B. K.	521
Rome, S. C.	521
Rosenberg, P.	431
	435
	456
	457
Rosenblatt, F.	503
	504
	505
	506
	507
	508
Rosenblith, W. A.	356
	360
	361
	408
	534
	702
	1,092
Rosenfield, G. H.	444
Rothschild, G. H.	979
Rozonoer, L. I.	224
Rudert, J.	84
	85
Rüdiger, A. O.	1,096
Rüdiger, W.	401
Rudner, R. S.	1,022
Rueping, R. R.	1,048
Russell, D. H.	79
	154
Russell, R. W.	429
Ruyer, R.	1
Ruzic, N. P.	35
Ryan, T. A.	575
Ryle, G.	66
Sadosky, M.	5
	87
Salman, D. H.	813
Saltz, E.	758
Samson, E. W.	1,052
	1,054
Samuel, A. L.	939
Sandel, T. T.	361
Sarkisov, S. A.	402
Sato, T.	584
Scharmann, T.	84
Scheerer, M.	559
Scher, J. M.	628
Schiller, F. C. S.	46
Schlag, J.	346
Schlechtinger, W.	84
Schliebe-Lippert, E.	85
Schlosser, H.	84
Schmeing, K.	84
Schmitt, O. H.	137
Schneider, E.	84
	738
Schneider, R.	960
Schneyer, S.	669
Schoenfeld, W. N.	779
Schorn, M.	84
	85
Schutzenberger, M. P.	956
Schwartz, L. S.	1,004
	1,006
	1,089
Schwartz, M.	852
Schwung, H.	84
Scott, D. K.	433
Seaquist, M. R.	1,013
Sechenov, I. M.	205
Seeger, C. M.	548
Seeger, E.	106
Seibel, J. L.	955
Selfridge, O. G.	16
	437
	498
	502
	612
	718
Sellars, W.	60
Semmes, J.	308
Serpinskii, V. V.	993
Shackle, G. L. S.	1,011
Shanks, B.	998
Shannon, C. E.	153
	613
	910
	912
Shaw, J. C.	918
	919
	925
	930
	992
	1,016
	1,018
Shaw, M. E.	951
	979
Shelly, C.	1,028
Shepard, D. H.	454
Shepard, R. N.	723
	838
Sherif, M.	760
Sherman, H.	478
Sherrington, C. S.	249
Shimbel, A.	736
Sholl, D. A.	395
Shreider, Yu. A.	36
	215
Shtiurmer, E. B.	344
Shultz, G. L.	459
Sidman, M.	837
	1,023
Siebert, W. M.	351
Siegel, S.	1,007
Silander, F. S.	1,037
Silverman, A. J.	1,107
Silverstein, A.	596
Simon, H. A.	917
	918
	925
	930
	989
	1,012
	1,032
Simoneit, M.	84
Sinaiko, H.	1,041
Singer, J. R.	707
Sluckin, W.	4
	69
Smedslund, J.	589
	745
Smirnov, G. D.	544
Smirnova, I. M.	224
Smith, A. K.	964
Smith, G.	646
Smith, G. J. W.	73
Smith, J. E., Jr.	717
Smith, O. W.	620
Smith, P. C.	620
Smith, S. T.	710
Smith, W. A. S.	986
Smith, W. M.	636
Smythies, J. R.	653
Snell, J. L.	849
Snider, R. S.	373
Snygg, D.	752
Sodhi, K. S.	85
Sokolov, E. N.	588
Solomon, L. N.	763
Solomon, R. L.	778
	793
Solomonoff, R. J.	922
	1,030
	1,039
Spence, K. W.	741
	742
	749
Sperling, P. I.	424
Sperry, R.	58
	255
	829
Spiker, C. C.	231
Sprick, W.	479
Staats, A. W.	216
	843
Stake, R. E.	854
Stamm, J. S.	307
Stark, L.	289
	292
Stein, M.	359
	968
Stein, P.	921
Steinbuch, K.	470
Steinschneider, A.	818
Stellar, E.	399
Stenvers, H. W.	538
Stevens, K. N.	721
Stevens, S. S.	255
	406
	593
Stewart, P. A.	330
Stillman, R. C.	169
Stoddard, J. C.	434
Stolurow, L. M.	808
Storr, A.	985
Strassman, A. J.	1,087
Straughan, J. H.	768
Strickland, J. F.	979
Ström, L.	398
Stroud, J.	946
Struck, E.	85
Strumwasser, F.	348
Strunz, K.	84
	85
Stumpers, F. L.	1,058
Stumpers, H. M.	1,081
Suhr, P. J.	460
Sumner, F. H.	494
	720

Author	Entry
Suppes, P.	855
	874
	962
Sutherland, I.	27
Sutherland, W. R.	27
Suttinger, G.	84
Suzumura, K.	674
Sward, G. L.	933
Sweeney, R.	19
Swerling, P.	529
Swets, J. A.	558
Sysin, A. Ya.	1,113
Szewczuk, W.	180
Tadenuma, R.	517
Tagiuri, R.	196
	696
	1,036
Tajfel, H.	645
Takada, Y.	1,056
Takahashi, S.	477
	517
Takahasi, H.	1,093
Tal, A. A.	224
Tanner, W. P., Jr.	558
	560
Tardy, V.	167
Tasaki, I.	259
Taube, M.	10
Tausch, R.	85
Taylor, D. W.	963
	969
	973
	974
Taylor, F. R.	185
Taylor, J. G.	195
Taylor, J. H.	621
Taylor, R. W.	651
Taylor, W. K.	155
	266
	475
	810
Teplov, B. M.	156
Tersoff, A. I.	463
Thenon, J.	625
Thomae, H.	84
	85
Thomas, G. J.	330
Thompson, H. B.	41
Thomson, R.	4
	69
Thost, H.	84
Thost, W.	84
Thrall, R. M.	781
	959
Thumb, N.	84
Thurstone, L. L.	186
	187
Toda, M.	608
Tolman, E. C.	124
Tompkins, C. B.	914
Tompkins, H. E.	137
Tregerman, L.	472
Trimmer, J. D.	2
Tsetlin, M. L.	135
	1,113
Tunis, C. J.	494
Turing, A. M.	942
Turner, S. H.	1,069
Uhr, L.	488
Ulam, S.	921
Underwood, B. J.	809
	878
	892
	896
Undeutsch, U.	84
	85
Unger, S. H.	471
	486
Urban, G. H.	461
Uttley, A. M.	613
	711
	719
	836
	873
	898
	938
Vacca, R.	1,095
Valentiner, T.	84
van Bergeijk, W. A.	675
van de Geer, J. P.	1,010
Vanderplas, J. M.	869
van Parreren, C. F.	88
van Soest, J. L.	1,074
Vasil'yev, R. R.	25
Vediaev, F. P.	181
Vernon, M. D.	580
	631
Verplanch, W. S.	779
Vince, M. A.	525
	735
Vincent, M.	601
Vitrotti, G.	665
Vleduts, G. M.	993
Voas, R. B.	238
Vogel, T.	98
Voitinski, E. Ia.	630
von Bracken, H.	84
	85
von Ditfurth, H.	170
von Fieandt, K.	614
	684
von Foerster, H.	946
	1,067
Von Furster, H.	16
von Neumann, J.	211
	944
von Niederhoffer, E.	84
Voronine, L. G.	78
Wada, H.	477
	517
Wagman, I. H.	286
Walker, E. L.	839
Wall, P. D.	267
	290
Wallace, W. H.	1,069
Wallach, H.	522
	894
Waller, H. J.	421
Walter, W. G.	83
Wand, B.	1,014
Wang, H.	136
	159
Wapner, S.	654
Wasserman, P.	1,037
Watanabe, S.	517
Webb, W. B.	853
Weber, A.	84
Wegener, H.	85
Weidemann, J.	235
Weinschenk, C.	84
	85
Weir, D. A.	724
Weiss, T. F.	354
	361
Weisz, A.	658
Wellek, A.	84
	85
Wells, H. K.	157
Wendt, H. W.	84
Werner, H.	654
Wessel, A. E.	1,069
Westbrook, C. B.	13
Wewetzer, K. H.	85
White, B.	705
Whyte, L. L.	889
Wickens, D. D.	532
Wiener, N.	911
	946
Wiesner, J. B.	194
	223
Wightman, C. W.	509
Wilbur, R.	186
Wilde, K.	84
Williams, A. C., Jr.	1,020
Williams, L. G.	633
Williams, R. E.	431
	440
	456
	457
Williamson, R. G.	821
Willingham, W. W.	997
Willis, D. G.	726
Wilson, M. D.	760
Wilson, R. C.	244
Wine, R. L.	978
Winnefeld, F.	85
Winsor, A. L.	730
Witte, R. S.	862
Witte, W.	84
	85
Wohlwill, J. F.	655
	867
Wolf, A. K.	705
Wolfard, M. R.	132
Wolfson, R. J.	1,022
Woodworth, R. S.	212
Woolsey, C. N.	418
Wortheimer, M.	688
Woskow, M. H.	866
Wrigley, C.	329
Wulfeck, J. W.	621
	658
Wulff, J. J.	808
Wynne, L. C.	778
	793
Yablonskii, S. V.	24
Yakobson, Ya. S.	1,113
Yalan, E.	553
Yavitz, M. C.	507
Yemel'yanov-Yaroslavskii	271
Yngve, V. H.	516
Young, J. Z.	188
Zagorul'ko, L. T.	413
	539
Zagorul'ko, T. M.	413
Zajonc, R. B.	117
Zarncke, L.	84
Zavalloni, R.	663
Zeamar, D.	64
Ziegler, H. P.	335
Zimmerman, H. J.	223
Zimmerman, M. D.	712
Zotterman, Y.	398
Zuckerman, C. B.	642
Zvonarevic, M.	545